GROUND WAVE EMERGENCY NETWORK
FINAL OPERATIONAL CAPABILITY

ENVIRONMENTAL ASSESSMENT
FOR
CENTRAL UTAH RELAY NODE
SITE NO. RN 8C920UT

16 April 1993

Electronic Systems Center
Air Force Material Command, USAF
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THE GROUND WAVE EMERGENCY NETWORK (GWEN) IS A RADIO COMMUNICATION SYSTEM DESIGNED TO RELAY EMERGENCY MESSAGES BETWEEN STRATEGIC MILITARY AREAS IN THE CONTINENTAL UNITED STATES.

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NAME OF ACTION: GROUND WAVE EMERGENCY NETWORK
CENTRAL UTAH RELAY NODE

DESCRIPTION OF PROPOSED ACTION ALTERNATIVES:

The U.S. Air Force plans to construct a radio communications relay node in central Utah (Juab or Utah county) as part of the Ground Wave Emergency Network (GWEN) communications system. Five action alternatives associated with five candidate GWEN sites (CGSs) in central Utah and the no action alternative have been considered and evaluated in an environmental assessment (EA).

GWEN is a radio communications system designed to relay emergency messages between strategic military areas in the continental United States. The system is immune to the effects of high-altitude electromagnetic pulse (HEMP) energy surges caused by nuclear detonations in the ionosphere that would disrupt conventional communications equipment. A failure of such equipment would prevent timely communications among top military and civilian leaders and strategic Air Force locations and prevent U.S. assessment and retaliation during an attack. GWEN is an essential part of a defense modernization program to upgrade and improve our nation's communications system, thereby strengthening deterrence.

The GWEN system is a network of relay nodes, receive-only stations, and input/output stations. The relay node in central Utah would be part of the Final Operational Capability (FOC) phase of the GWEN system and would establish essential links with adjacent nodes in the network.

In September 1987, the U.S. Air Force Electronic Systems Division, Hanscom Air Force Base, Massachusetts published a Final Environmental Impact Statement (FEIS) for the GWEN FOC that addressed the system as a whole and identified expected environmental effects common to all sites. Section 5 of the FEIS described a siting process that is designed to minimize the potential for environmental impacts. This process has three distinct phases: network definition, regional screening, and individual site evaluation. Network definition identified the need for a relay node in central Utah. Regional screening resulted in the identification of five CGSs in central Utah that met the exclusionary and evaluative criteria described in that FEIS. Individual site evaluation examined the relative suitability of the CGSs through site-specific technical studies. The EA is a part of the third phase and is tiered from that FEIS. It addresses the potential environmental effects of the five action alternatives and the no action alternative.

The proposed relay node in central Utah will be an unmanned facility located on approximately 11 acres of land and, once constructed, will resemble an AM radio broadcast station. The facility will consist of a 299-foot-tall, low-frequency (LF) transmitter tower, three equipment shelters, an access road, and associated fences. The tower will be supported by 24 guy wires, including 12 top-loading elements. An equipment shelter at the tower base will contain an antenna tuning unit. An 8-foot-high chain link fence topped with barbed wire will surround the tower base and associated equipment shelter. A radial ground plane, composed of 60 to 100, 0.128-inch-diameter copper wires buried about 12 inches underground, will extend out about 330 feet from the tower base. A 4-foot-high fence will be installed around the perimeter of the copper radials.

A second equipment area located at the site perimeter will contain two shelters housing a back-up power group (BUPG) with two internal fuel storage tanks and radio processing equipment. The BUPG will operate during power outages and for testing purposes. An LF receive antenna, consisting of a pair of 4-foot-diameter rings mounted on a 10-foot pole, and an ultrahigh-frequency (UHF) antenna, used for communicating with airborne input/output terminals and consisting of a 9-foot-high whip-like antenna mounted on a 30-foot-high pole, will also be located in this area. An 8-foot-high chain link fence topped with barbed wire will enclose the entire equipment area. A 10-foot-wide gravel road will connect this area to the tower base. A 12-foot-wide gravel road will provide access to the site from a public road.

The station will use existing commercial three-phase electric power and telephone service. Power and telephone service will be brought to the site through either overhead or buried lines, depending on local utility practices. In its ready status, the antenna will transmit in the LF radio band at 150 to 175 kilohertz for a total of 6 to 8 seconds per hour.

Five action alternatives are discussed in this Finding of No Significant Impact (FONSI).

ANTICIPATED ENVIRONMENTAL EFFECTS

The EA evaluated potential impacts to the physical, biological, and socio-cultural environment from construction and operation of the relay node.

The project would have no significant impacts on physical resources. Erosion and increased runoff would be minimized by using proper erosion control techniques during construction. Sites currently in agricultural use will be replanted after construction; sites with desert vegetation will be restored to preexisting natural vegetation. Impacts to mineral resources would be minor. Paleontological resources are not likely to occur on any of the sites; therefore significant impacts to them are not anticipated. No prime farmland would be removed from production. Water quality would not be significantly affected because increases in copper concentrations due to corrosion of the ground plane would be negligible. Air quality would not be significantly affected. During construction, temporary and insignificant increases in emissions would occur, and during operation, emissions from the BUPG would not be sufficient to result in violation of air quality standards.

The project would have no significant impacts on biological resources. The sites are located on grazing land or former grazing land and do not contain sensitive wildlife habitat. None of the sites contains wetlands and none is within a 100-year floodplain. Informal consultation with the U.S. Fish and Wildlife Service indicated that the project would not affect any threatened or endangered species. The Utah State Division of Wildlife Resources indicated that no state-listed threatened or endangered species are known to occur on any of the sites. Bird-tower collisions may occur but would not be significant because the tower would be located away from primary bird habitats and migratory routes.

The project would have no significant impacts on socio-cultural resources. Construction would have a small, beneficial impact on the local economy, in part by providing temporary employment for contractors and construction workers. Community support systems would not be significantly affected. Land use and noise impacts would not be significant. The relay node signal would not interfere with commercial television or radio broadcasts, amateur radio operations, garage door openers, or pacemakers. Radio-frequency emissions outside the fenced area around the tower base would not pose a health hazard to humans or animals. The Utah Historical Society was consulted and concurred that the project would not affect significant cultural resources. Significant impacts to Native American traditional, religious or sacred sites are not anticipated. A visual analysis conducted in accordance with the criteria developed in the FOC FEIS concluded that the relay node facility would not cause significant visual impacts.

CONCLUSIONS:

No significant impacts to the surrounding environment would be caused by construction and operation of the proposed relay node on the Brough (CGS-2), Winn/Carter (CGS-6), Bowles (CGS-7), Steadman (CGS-8), or Millerberg (CGS-9) site. Therefore, an environmental impact statement for a GWEN relay node at the cited locations in central Utah is not required.

Robert A. Zongol
Chairman
HQ ESC Environmental Protection Committee

28 Apr 95
Date

PREFERRED GWEN SITE REPORT
CENTRAL UTAH

The U.S. Air Force is proposing to construct a relay node for the Ground Wave Emergency Network (GWEN) in central Utah. The Air Force has followed the siting process described in Section 5 of the Final Environmental Impact Statement (FEIS) for the Final Operational Capability (FOC) phase of the GWEN program to identify alternative Candidate GWEN Sites (CGSs). The five CGSs identified in central Utah are referred to as the Brough, Winn/Carter, Bowles, Steadman, and Millerberg sites.

This report summarizes the process of selecting the preferred site from the five CGSs. This PGSR, along with a site-specific Environmental Assessment (EA) and Finding of No Significant Impact (FONSI), is being distributed for information and comment in compliance with the Air Force's process of Interagency and Intergovernmental Coordination for Environmental Planning (IICEP).

Operational, environmental, and developmental suitability; construction and real estate acquisition costs; and public comments and concerns are all factors which have been considered in arriving at the selection of the preferred site.

Without an **operationally suitable** location, connectivity of the relay node in central Utah to the GWEN network cannot be achieved. Ground conductivity measurements are acceptable at all five CGSs. During the site-specific studies, no radio frequency interference was detected in the GWEN frequency bands which would interfere with the operation of the GWEN receiver. Also, operations at any of the sites would pose no interference with other known systems. Therefore, all five CGSs are operationally suitable.

The next major factor considered in the selection of the preferred site was **environmental suitability**. The environmental suitability of each CGS was determined from information provided by an independent field analysis and is documented in the EA. The EA for the five CGSs was completed in April 1993. The EA found that no significant impacts would result from construction of the GWEN relay node at any of the five sites. A FONSI for these five sites was completed on 28 April 1993. Thus, all five CGSs are environmentally suitable, and none is environmentally favored over the others.

The next factor to consider in the selection of the preferred site is **developmental suitability**. The FAA has approved construction of the GWEN relay node at any of the five CGSs. However, **construction costs** at the site vary and are a discriminator in the selection of the preferred site. Construction cost at the Brough site is unacceptably high, making it only marginally acceptable. Construction costs at the Winn/Carter and Bowles sites are high but acceptable. Construction costs at the Steadman and Millerberg sites are lower than average. Thus, although all five sites are suitable for development, the Brough site is only marginally acceptable due to high construction cost, and the Steadman and Millerberg sites are favored for low construction cost.

Real estate negotiations have been completed for the Brough, Winn/Carter, and Millerberg sites. All three landowners prefer to sell their property. Negotiations have been suspended for the Bowles and Steadman sites.

With operational, environmental, and developmental factors evaluated and acquisition and construction costs considered, the Air Force prefers the Millerberg

site. The Millerberg site is preferred because it is operationally, environmentally, and developmentally suitable; construction costs are favorable; and negotiations have been completed with the landowner.

I have therefore selected the Millerberg site as the Air Force's preferred site for development as the GWEN relay node in central Utah. After reviewing the information received during the IICEP process, I will direct the final land acquisition activities and construction of the GWEN relay node.

STEPHEN T. MARTIN, LT COL, USAF
Program Manager, GWEN

29 April 93
(Date)

GROUND WAVE EMERGENCY NETWORK
FINAL OPERATIONAL CAPABILITY

ENVIRONMENTAL ASSESSMENT
FOR
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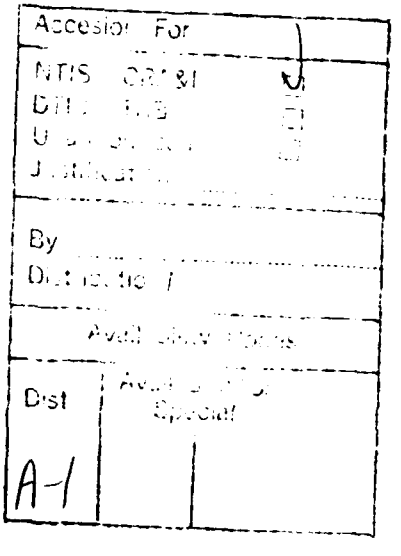
SITE NO. RN 8C920UT

16 April 1993



Electronic Systems Center
Air Force Material Command, USAF
Hanscom AFB, Massachusetts 01731-1623

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SUMMARY

The Ground Wave Emergency Network (GWEN) is a radio communication system designed to relay emergency messages between strategic military areas in the continental United States. The system is immune to the effects of high-altitude electromagnetic pulse (HEMP) energy surges caused by nuclear bursts in the ionosphere that would disrupt conventional communications equipment such as telephones and shortwave radios. A failure of such equipment would prevent timely communications among top military and civilian leaders and strategic Air Force locations and prevent U.S. assessment and retaliation during an attack. GWEN is an essential part of a defense modernization program to upgrade and improve our nation's communications system, thereby strengthening deterrence.

The GWEN system consists of a network of relay nodes, receive-only stations, and input/output stations. Each relay node, such as the one proposed in central Utah, consists of a guyed radio tower facility similar to those used by commercial AM broadcast transmitters.

A Final Environmental Impact Statement (FEIS) for the GWEN Final Operational Capability (FOC) was published in September 1987 by the Electronic Systems Division, Hanscom Air Force Base, Massachusetts. That FEIS addressed the GWEN system as a whole, identifying expected environmental effects common to all sites. Section 5, beginning on page 5-1 of the FEIS, describes a siting process that is designed to minimize the potential for environmental impacts. This process has three distinct phases: network definition, regional screening, and individual site evaluation.

Phase 1, network definition, identified the geographic coordinates that met the operational needs and technical constraints of the network. Each set of coordinates became the center of a circular site search area (SSA) with a 9-mile radius (250 square miles). The SSA discussed in this Environmental Assessment (EA) contains portions of Utah and Juab counties and was centered approximately 5 miles northwest of the town of Nephi in Juab County, in central Utah, at latitude 39.74° N and longitude 111.93° W. However, the SSA was elongated approximately 18 miles northward after a preliminary

visit found additional area would be required to obtain an adequate number of candidate GWEN sites (CGSs). The area of the final, teardrop-shaped SSA is approximately 370 square miles. The principal towns in the SSA are Nephi, Genola, Mona, and Goshen.

Phase 2, regional screening, involved the application of exclusionary and evaluative criteria to the SSA to avoid environmentally sensitive areas. The remaining areas, called potential areawide sites (PAWS), became the focus of the siting process. A field investigation for central Utah was conducted in April 1990. Eleven sites were identified during automobile-based surveys as potential candidate GWEN sites (PCGSs). Attempts were made to contact the owners of the sites to determine their interest in selling or leasing land to the Government. Rights-of-entry were granted to investigate six PCGSs. Following evaluation against the environmental siting criteria set forth in the FEIS, five of the six PCGSs were recommended as CGSs for further review. These CGSs were described in the Preliminary Site Evaluation Report (PSER) of June 26, 1990.

Subsequent to the PSER being issued, and the site-specific studies being accomplished, a CGS landowner withdrew one site from consideration (Bowles, CGS-7). This landowner is no longer interested in leasing or selling land to the Air Force. However, since the site-specific studies had been accomplished on this site prior to the owner's withdrawal and because this site continues to be considered a viable alternative, the Air Force has presented this data on the withdrawn site in this EA.

Also subsequent to the PSER being issued, it was determined the right-of-way for State Highway 68 adjacent to CGSs -8 and -9 was wider than originally identified at the time of the field investigation. Therefore, these two CGSs were moved an additional 100 feet from State Highway 68 to allow for future highway expansion.

Phase 3, individual site evaluation, involves evaluating the relative suitability of the candidate sites through site-specific technical studies. This EA is a product of those evaluations and discusses the five siting alternatives in central Utah. It addresses only those siting criteria that apply to the candidate sites. The sixth alternative, no action, would impair performance of the GWEN system but leave the environment unchanged.

To be suitable for construction and operation, a site should measure at least 700 by 700 feet (approximately 11 acres), be relatively level and undeveloped, be free of natural or man-made obstructions, and have soils capable of supporting relay node structures. The site should also be close to all-weather roads, commercial three-phase power, and telephone lines to minimize costs. To operate effectively, the site must be located at least a minimum distance from obstructions that could affect reception and transmission. These include buildings and towers, high-voltage power lines, and other communications systems or sources of radio-frequency interference. Specific minimum distances depend on height and power levels of identified obstructions or interfering sources.

This EA shows that construction and operation of a GWEN relay node would have no significant impacts if built on any of the five sites. During the 6-week construction period, the project would cause temporary and insignificant air quality and noise impacts and slight increases in traffic. It would have a small, beneficial impact on the local economy, in part because it would provide temporary employment for contractors and construction workers. If constructed on any of the sites, the project would have no significant impacts on air quality; water quality; land use; mineral resources; known paleontological resources; biological resources, including threatened and endangered species; or cultural resources that are listed, eligible, or potentially eligible for listing on the National Register of Historic Places. Visual impacts would not be significant. Radio-frequency emissions outside the fenced area around the tower base would not pose a health hazard to humans or animals.

1.0 PURPOSE AND NEED FOR ACTION

The proposed action covered by this Environmental Assessment (EA) includes construction and operation of a relay node of the Ground Wave Emergency Network (GWEN) in central Utah (see Figure 1.1 of this EA). This relay node will provide essential connections with adjacent nodes in the network. The major features of a GWEN relay node and associated environmental impacts common to all sites are addressed in the Final Environmental Impact Statement (FEIS) for the Final Operational Capability (FOC) phase of GWEN, which was published in September 1987 by the Electronic Systems Division, Hanscom Air Force Base, Massachusetts. This EA is tiered from that FEIS and addresses site-specific conditions at the candidate GWEN sites (CGSs) for this particular site search area (SSA).

The purpose of GWEN is to provide to the President and the National Command Authority a strategic communications network that is immune to the effects of high-altitude electromagnetic pulse (HEMP) and will carry critical attack warning and force execution data. As a result, GWEN will remove any possibility of potential aggressors taking advantage of the electromagnetic pulse generated by a high-altitude nuclear burst. A HEMP surge would disrupt the nation's electric power line transmission capability, cripple electronic devices, and adversely affect skywave communications networks based on conventional electronics. GWEN provides a low-frequency (LF) ground wave communication network that will not be affected by HEMP effects. It thereby strengthens deterrence by removing the option of beginning an attack against the United States by using HEMP effects.

A partial GWEN network, called the Thin Line Connectivity Capability (TLCC), has been completed. It contains 8 input/output stations, 30 receive-only stations, and 54 relay nodes. The TLCC provides a limited level of HEMP-protected communications to strategic forces and the National Command Authority.

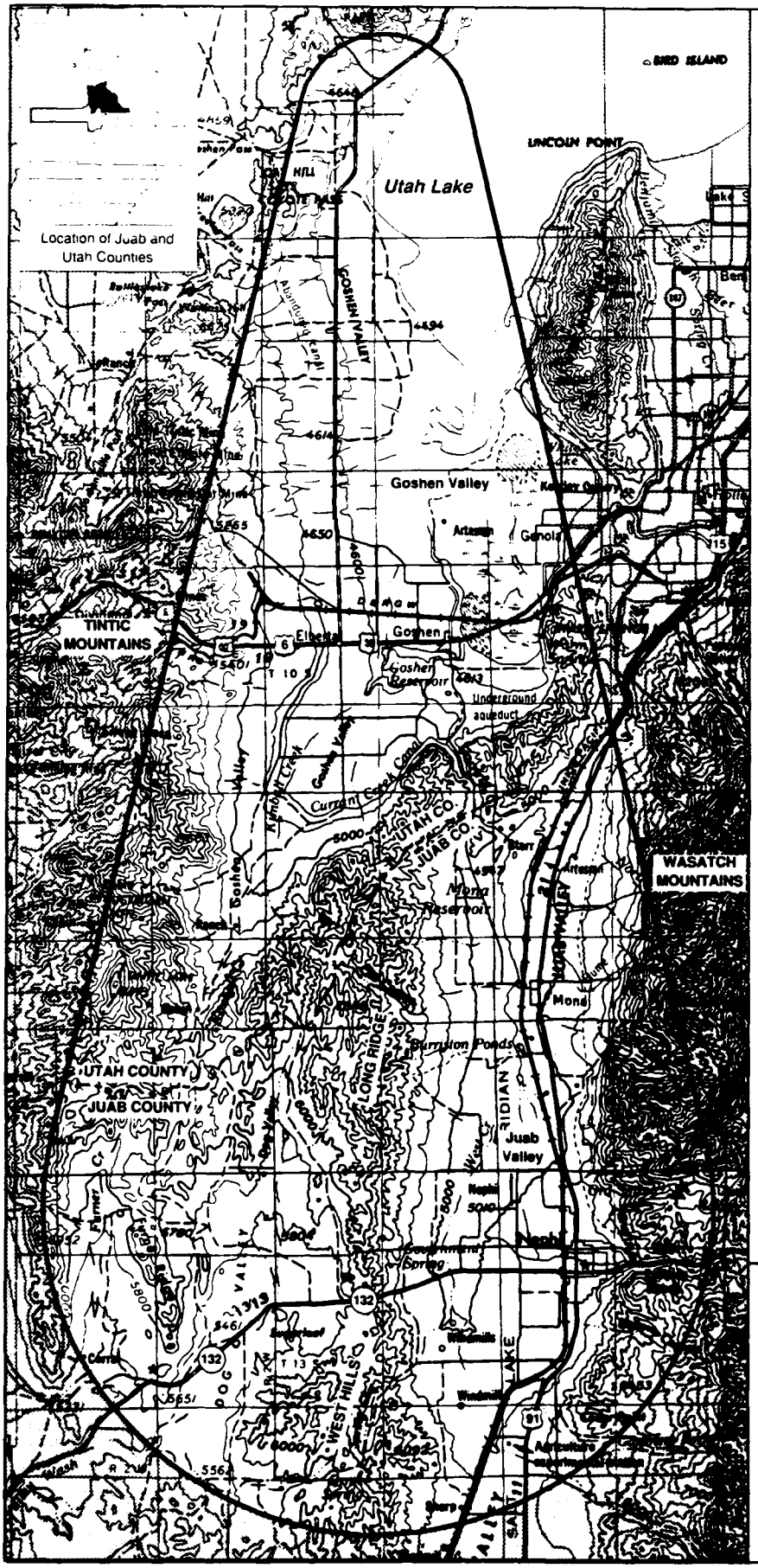

FIGURE 1.1
CENTRAL UTAH SITE SEARCH AREA (SSA), UTAH AND JUAB COUNTIES, UTAH

BASE MAP SOURCES: USGS QUADRANGLES, SCALE 1:250,000 — TOOELE, UTAH, 1953 (REVISED 1970); SALT LAKE CITY, UTAH & WYOMING, 1954 (REVISED 1970); DELTA, UTAH, 1953 (REVISED 1972); PRICE, UTAH, 1956 (REVISED 1970)

The FOC phase of GWEN will add 29 relay nodes. The FOC will allow communication along several routes, thereby enhancing system availability and ensuring that vital communications will be maintained.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

The five action alternatives are site-specific applications of the standard relay node design presented in the FEIS. Consequently, they share a number of features that are discussed in Section 2.1 of this EA. Site descriptive data was obtained during field investigations conducted in April 1990. The site-specific features are discussed in Sections 2.2 through 2.6 of this EA. Figure 2.1 of this EA shows the CGSs in relation to the major features of the SSA. Figures 2.2A, 2.2B, and Appendix B of this EA show the locations of the CGSs in relation to roads and surrounding topography, respectively.

2.1 Common Features of the Action Alternatives

2.1.1 Site Selection Process

The process used to select sites is described in Section 5, beginning on page 5-1 of the FEIS. This process has three distinct phases: network definition, regional screening, and individual site evaluation. Appendix A of this EA provides a diagram of the site selection process, and the environmental criteria used in this process are defined in Tables 5-1 and 5-2, pages 5-7 through 5-14 of the FEIS.

Phase 1, network definition, involved locating network nodes to optimize their performance while serving a predetermined number of users. A typical GWEN ground wave has an effective range of about 150 to 200 miles. Thus, relay nodes could not be located independently; changing the location of one would affect the connectivity with other nodes in the network. Once the optimal coordinates of the relay nodes were identified, a 9-mile-radius SSA was defined around each point to provide suitable opportunity for siting a relay node near that point. The 9-mile radius was chosen because it provided a reasonably sized search area consistent with the technical constraints on the relay node. If a significant portion of an SSA fell within an environmentally highly sensitive area such as a national park or wilderness area, an alternative was selected and its connectivity evaluated. This process was repeated until all relay nodes fell outside such areas.

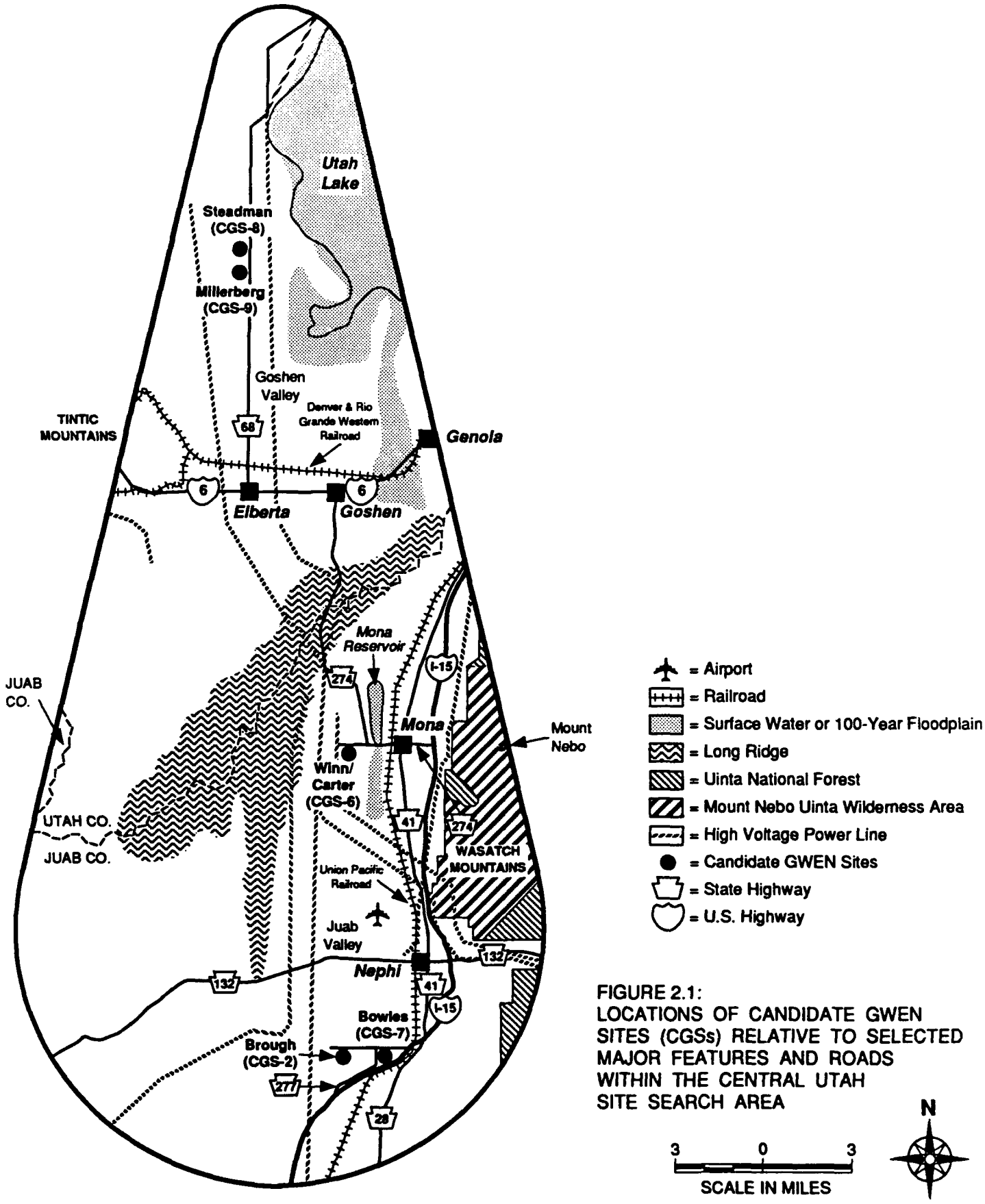

FIGURE 2.1:
LOCATIONS OF CANDIDATE GWEN SITES (CGSs) RELATIVE TO SELECTED MAJOR FEATURES AND ROADS WITHIN THE CENTRAL UTAH SITE SEARCH AREA

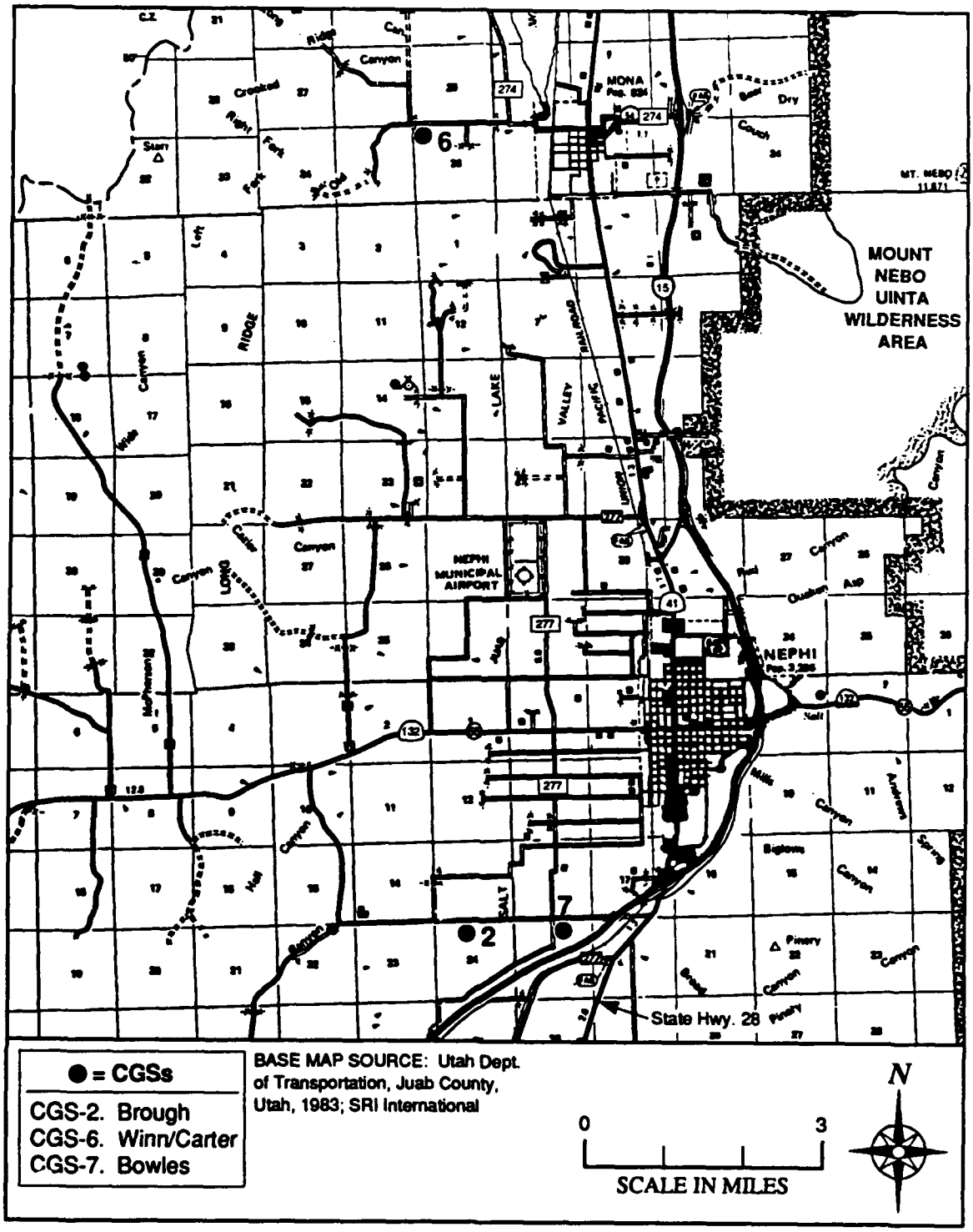

FIGURE 2.2A LOCATIONS OF CANDIDATE GWEN SITES (CGSs) IN JUAB COUNTY

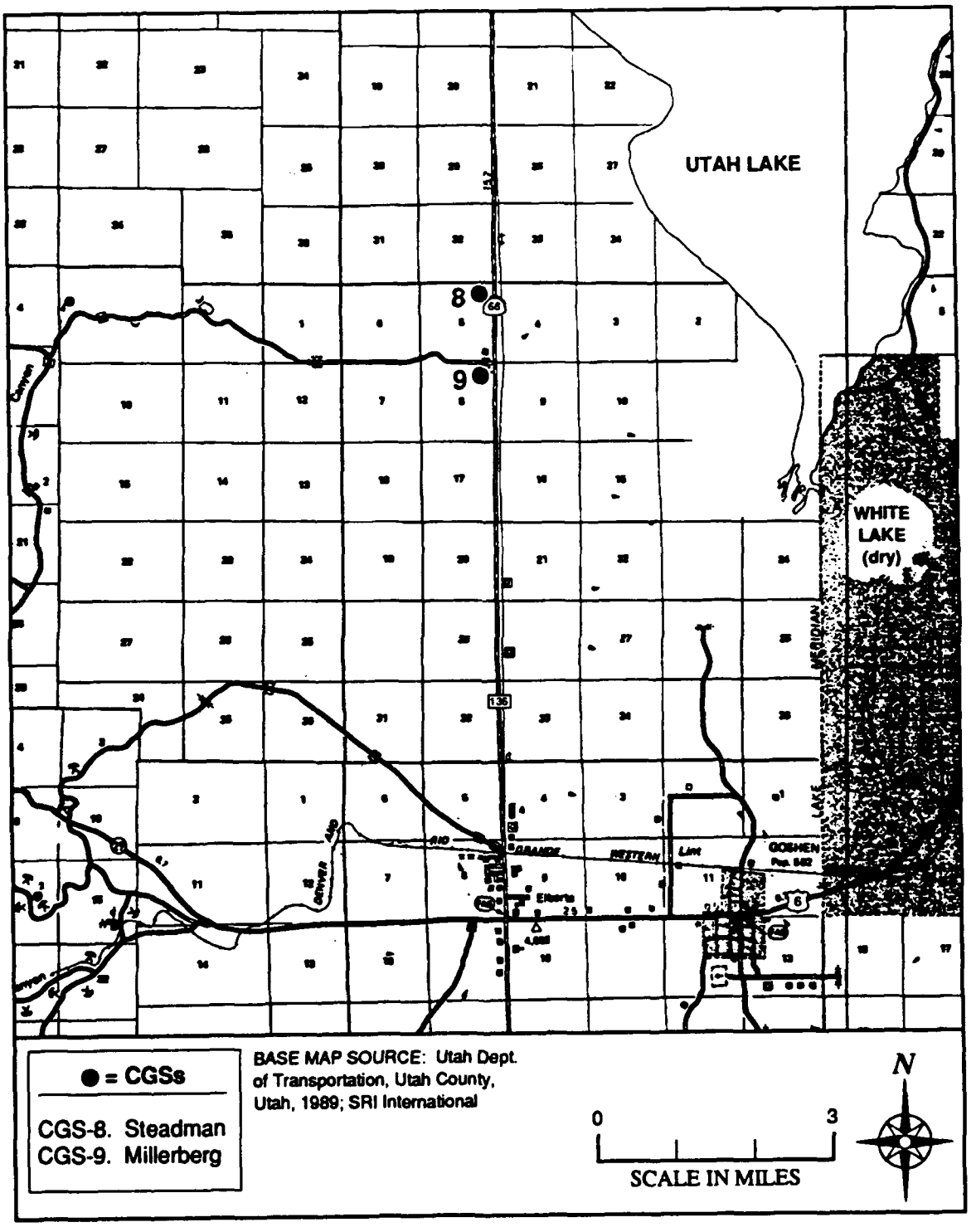

FIGURE 2.2B LOCATIONS OF CANDIDATE GWEN SITES (CGSs) IN UTAH COUNTY

The SSA in central Utah was elongated approximately 18 miles northward after a preliminary visit found additional area would be required to obtain an adequate number of CGSs. The area of the final teardrop-shaped SSA for central Utah was approximately 370 square miles.

Phase 2, regional screening, involved the application of exclusionary and evaluative criteria to the SSA to identify areas that might contain operationally acceptable sites outside environmentally sensitive areas. The resulting search areas, called potential areawide sites (PAWS), were submitted to appropriate federal, state, and local officials for review. The PAWS were then redefined, as appropriate, by incorporation of the comments of the reviewers, and a field investigation was conducted to find suitable candidate sites for a GWEN relay node within the redefined PAWS.

The field investigation for central Utah was conducted in April 1990. Eleven sites were identified during automobile-based surveys as potential candidate GWEN sites (PCGSs). Attempts were made to contact the owners of the sites to determine their interest in selling or leasing land to the Government. Rights-of-entry were granted to investigate six PCGSs. Following evaluation against the environmental siting criteria set forth in the FEIS, five of the six PCGSs were recommended as CGSs for further review.

Subsequent to the PSER being issued, and the site-specific studies being accomplished, a CGS landowner withdrew one site from consideration (Bowles, CGS-7). This landowner is no longer interested in leasing or selling land to the Air Force. However, since the site-specific studies had been accomplished on this site prior to the owner's withdrawal and because this site continues to be considered a viable alternative, the Air Force has presented this data on the withdrawn site in this EA.

Also subsequent to the PSER being issued, it was determined that the right-of-way for State Highway 68 adjacent to CGSs -8 and -9 was wider than originally identified at the time of the field investigations. Therefore, these two CGSs were moved an additional 100 feet from State Highway 68 to allow for future highway expansion.

Phase 3, individual site evaluation, of which this EA is a part, is then used to determine the relative suitability of the candidate sites through site-specific technical studies. This EA presents the results of the environmental portions of those studies and covers site-specific impacts associated with construction of a relay node in central Utah. These are summarized in Sections 4.2 through 4.6 of this EA. The findings of this EA and site-specific studies of operational parameters will be used to select a preferred GWEN site (PGS).

2.1.2 Relay Node Construction and Operation

A typical relay node site is located on approximately 11 acres of land (see Figure 2.3 of this EA). It is an unmanned facility consisting of a 299-foot-tall, three-sided, 2-foot-wide LF transmitter tower, three equipment shelters, an access road, and associated fences. The tower has a base insulator and lightning protection and is supported by 24 guy wires, including 12 top-loading elements to further strengthen the signal and provide additional structural support.

These guy wires and top-loading elements are attached to the tower and 18 buried concrete anchors. The sizes of these anchors and their depth of burial varies with local soil and bedrock properties. However, the guy-wire anchors typically are rectangular blocks buried 5 feet below the surface. If bedrock occurs at or near the surface, the anchors are special rock-embedded rods. The tower base is concrete with a cross-section area resembling an inverted T. The size of this foundation is determined by soil conditions.

A radial ground plane, composed of 60 to 100 buried copper wires, extends out from the base of the tower. Each wire is 0.128 inch in diameter, about 330 feet long, and buried approximately 12 inches underground. The ground plane helps to strengthen the broadcast signal, and the number and length of the wires depend on the soil conductivity at the site. A 4-foot-high fence is installed around the perimeter of the ground plane tc protect the ground plane and guy anchors and to prevent inadvertent exposure to electric shock resulting from the buildup of static electric charge.

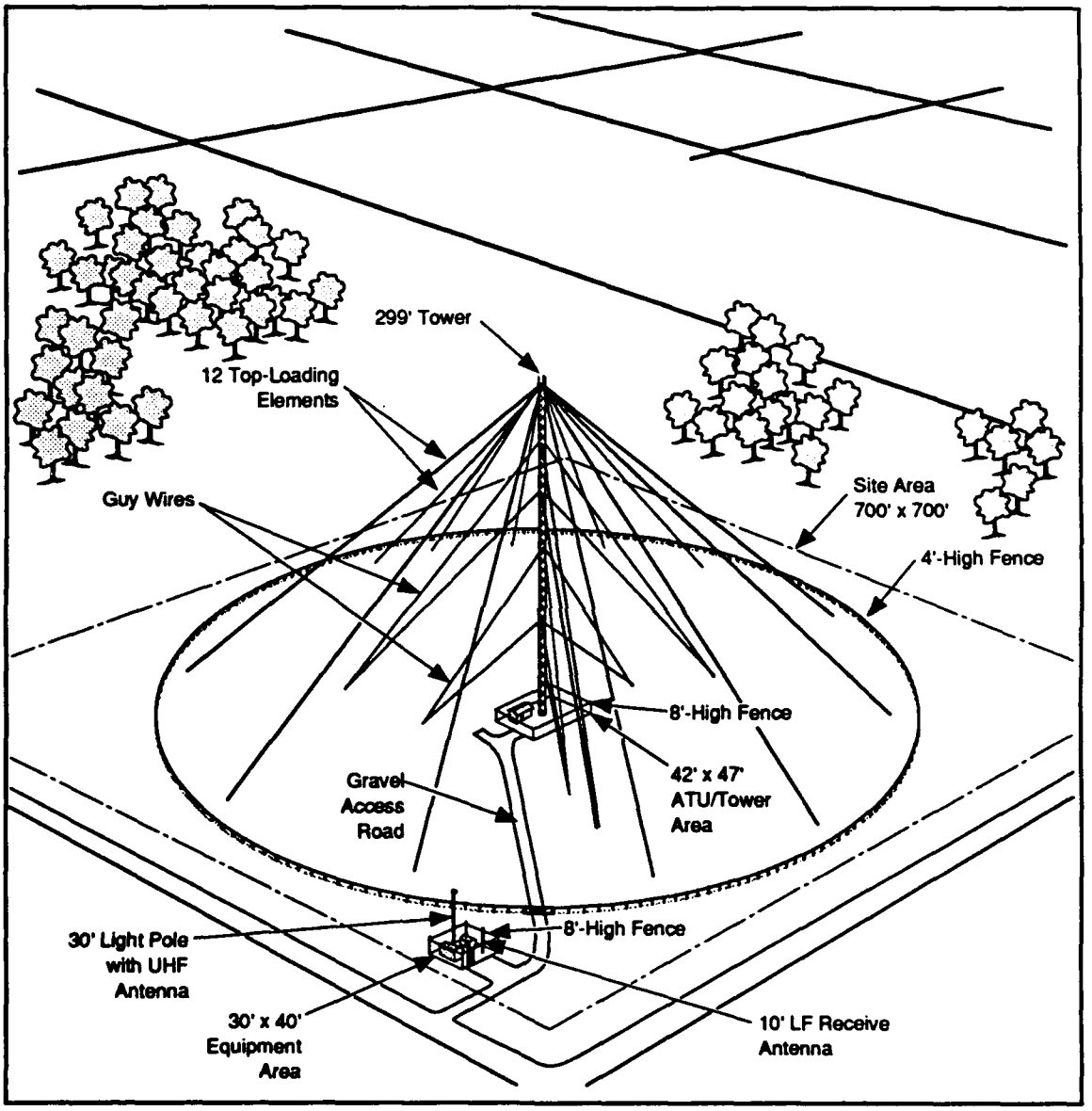

FIGURE 2.3 TYPICAL LAYOUT OF FOC RELAY NODE STATION

In addition to the main tower, the relay node has two other antennas. One is an LF receive antenna made up of a pair of 4-foot-diameter rings mounted on a 10-foot pole. The second is an ultrahigh-frequency (UHF) antenna used for communicating with airborne input/output terminals. It is a 9-foot-high whip-like antenna mounted on a 30-foot-high pole. Both antennas are located within the equipment area at the perimeter of the site, which is enclosed by an 8-foot-high fence.

The siting and design of the tower are coordinated with the Federal Aviation Administration (FAA) to ensure compliance with FAA standards and regulations. The tower is equipped with a white strobe light at the top, which emits 40 flashes per minute and is rated at 20,000 candelas for daytime and twilight use and 2,000 candelas for nighttime use. To minimize glare at ground level, the light is focused upward and horizontally outward.

GWEN operates intermittently in the LF radio band at 150 to 175 kilohertz (kHz). For comparison, the low end of the AM band for commercial broadcasts is 530 kHz. The peak broadcast power for each GWEN tower is from 2,000 to 3,000 watts, depending on local soil conditions. In its ready status, GWEN typically transmits between 6 and 8 seconds per hour. GWEN does not interfere with commercial television, radio broadcasts, amateur radio operations, garage door openers, or pacemakers, as noted in Section 2.1.1.1, page 2-3 of the FEIS.

All equipment shelters are anchored to concrete pads. One shelter, located at the base of the tower, houses the antenna tuning unit (ATU). Two other shelters are located side by side in the equipment area enclosed at the perimeter of the property. One houses radio processing equipment, and the other houses a 70-horsepower, back-up diesel generator and two aboveground fuel tanks. The generator operates 2 hours per week for testing purposes and during power outages. Locked, 8-foot-high chain link fences topped with barbed wire secure the equipment shelter areas at the base of the tower and at the perimeter of the site to provide safety and to inhibit unauthorized entry. A 12-foot-wide gravel road provides access to the equipment area enclosure at the perimeter of the property. A 10-foot-wide gravel road leads from the equipment enclosure to the tower.

Fuel is stored in two aboveground steel tanks inside the generator shelter. Tank capacities are 559 gallons and 461 gallons. Each tank pipes fuel separately to the back-up power group (BUPG) and is equipped with two outlet shut-off valves, one controlled manually and one controlled automatically. If a leak occurs, fuel will flow into a floor drain leading to a tightly capped pipe extending outside the BUPG. Once approximately 2 gallons of fuel accumulate in the pipe, a "liquid spill" signal is sent to the GWEN Maintenance Notification Center, which will dispatch maintenance personnel. However, if a leak were not detected, an explosion inside the shelter would be extremely unlikely due to the high flash point of diesel fuel. If a tank at the GWEN station failed, the entire contents of one tank could be released and contained inside the BUPG shelter. Refer to Section 4.12.1.1, beginning on page 4.12-1 of the FEIS for further discussion on diesel fuel spills and leaks.

The station uses existing commercial three-phase electric power and telephone service, but does not require water, septic, or sewer systems. Power and telephone service are brought to the site through either overhead or buried lines depending on local utility practices. Power and telephone service are generally brought underground from the site boundary to the equipment shelter area.

Temporary increases in air pollutant emissions will occur during construction, primarily from greater use of heavy machinery than is required in normal farming operations. Emissions resulting from operation of the facility will be limited to the operation of the BUPG, which will operate only 2 hours every week for testing purposes and for additional periods as required during power outages. Thus, the generator will operate for a total of 152 hours per year, if commercial power outages totaled 48 hours. If the generator runs at 100 percent load during the projected 152-hour operating time, total emissions in one year will be less than 350 pounds per pollutant, as documented in Section 4.3.1, beginning on page 4.3-1 of the FEIS.

Noise levels generated by construction equipment are discussed in Section 4.5.1.1, beginning on page 4.5-1 of the FEIS. Under worst-case assumptions, levels could reach 78 dBA at the site boundary from on-site activity and 92 dBA at distances of 50 feet from

equipment installing the off-site access road. Noise generated during GWEN operation would come from the BUPG, which will operate only 2 hours per week and during commercial power outages. The BUPG will be located at least 50 feet within the site boundary with its exhaust side oriented toward the tower area. Noise levels due to intermittent operation of the BUPG will be less than 72 dBA at the site boundary, which is within the standards typically set for lands under agricultural use (70 to 75 dBA). At 50 feet beyond the site boundary, the noise level would drop below 65 dBA, which is within the standards typically set for residential and mixed residential/agricultural use (55 to 65 dBA). These noise levels and standards are discussed in Section 3.5.3, page 3.5-2 and Section 4.5.1, pages 4.5-1 through 4.5-6 of the FEIS.

Construction will require as many as 20 workers at any given time and take about 6 weeks. Standard earth-moving and erection equipment will be used, as detailed in Table 2-1, page 2-14 of the FEIS. Erosion control techniques that are consistent with local practices will be used during construction. Grading and vegetation removal will be minimal at all sites. Sites currently in agricultural use will be replanted after construction is finished; sites with desert vegetation will be restored to preexisting natural vegetation.

After construction is completed, personnel requirements will be limited to periodic maintenance by a contractor who will service the equipment, cut the surface growth, remove snow from the access road, and perform other services, as needed. Security services will be arranged with local authorities. The projected life of the facility is 15 to 25 years. Upon decommissioning, the tower and other structures will be removed, as discussed in Section 2.1.4, page 2-18 of the FEIS.

2.2 Alternative 1: Brough Site (CGS-2)

The Brough site is located in the northeast quarter of the northwest quarter (NE1/4 NW1/4) of Section 24, Township 13S, Range 1W, Juab County, approximately 2.3 miles west of State Highway 28 on the south side of an unnamed county road running between Sections 24 and 13. A 25-foot access road would be required from the county road.

Power would be obtained from overhead lines on the south side of the unnamed county road, adjacent to the northern site boundary, after they have been upgraded from two-phase. One mile of two-phase lines would require upgrading. Telephone service would be connected to a buried cable located approximately 2 miles east of the CGS on the south side of the unnamed county road.

Appendix B, Figure B.1 of this EA, provides a map showing the surrounding topography.

2.3 Alternative 2: Winn/Carter Site (CGS-6)

The Winn/Carter site is located in the NW1/4 NW1/4 of Section 36, Township 11S, Range 1W, Juab County, 1.1 miles west of State Highway 274, in the southeastern corner of the intersection of an unnamed county road that runs east-west between Sections 25 and 36, and a dirt trail that runs north-south between Sections 35 and 36. A 10-foot access road would be required from the unnamed county road along the northern border of the site.

Three-phase power would be obtained from overhead lines along the northern edge of the site. Telephone service would be connected to an underground cable along the western side of State Highway 274, 1.1 miles east of the site.

Appendix B, Figure B.2 of this EA, provides a map showing the surrounding topography.

2.4 Alternative 3: Bowles Site (CGS-7)

The Bowles site is located in the NW1/4 NE1/4 of Section 19, Township 13S, Range 1E, Juab County, approximately 1.1 miles west of State Highway 28, in the southeastern corner of the intersection of County Road 277, which runs north-south, and an unnamed county road that runs parallel to, and 0.1 mile south of, the northern boundary of Section 19. A 30-foot access road would be required from the south side of the county road.

Three-phase power would be obtained from overhead lines at the northwest corner of the site. Telephone service would be connected to a buried cable located approximately 1 mile east of the CGS on the south side of the unnamed county road.

Appendix B, Figure B.3 of this EA, provides a map showing the surrounding topography.

2.5 Alternative 4: Steadman Site (CGS-8)

The Steadman site is located in the NE1/4 NE1/4 of Section 5, Township 9S, Range 1W, Utah County, on the west side of State Highway 68, approximately 7.8 miles northwest of Goshen. A 125-foot access road would be required from State Highway 68.

Three-phase power would be obtained from overhead cables 190 feet east of the site, on the east side of State Highway 68. Telephone service would be connected to an underground cable 100 feet east of the site.

Appendix B, Figure B.4 of this EA, provides a map showing the surrounding topography.

2.6 Alternative 5: Millerberg Site (CGS-9)

The Millerberg site is located in the NE1/4 NE1/4 of Section 8, Township 9S, Range 1W, Utah County, on the west side of State Highway 68, 6.8 miles northwest of Goshen. A 135-foot access road would be required from State Highway 68.

Three-phase power would be obtained from overhead cables 320 feet northeast of the site. Telephone service would be connected to a underground cable 100 feet east of the site.

Appendix B, Figure B.5 of this EA, provides a map showing the surrounding topography.

2.7 No Action Alternative

The no action alternative is deletion of the central Utah relay node from the GWEN network. Adoption of this alternative would mean a consequent degradation in the performance of the system due to a lack of connectivity to other nodes in the system.

3.0 AFFECTED ENVIRONMENT

This section discusses the environmental setting of the proposed GWEN project in central Utah. Section 3.1 of this EA describes the general characteristics of the SSA, and Sections 3.2 through 3.6 of this EA describe the unique characteristics of each CGS within the SSA. Site descriptive data was obtained during field investigations conducted in April 1990. U.S. Geological Survey 7.5 minute topographical maps were used as data sources for distances, physiographic features, and topography (USGS, 1967a-b, 1969, 1975a-e, 1979a-d, and 1983a-d).

3.1 Site Search Area

Presented below is information on the physical, biological, and socio-cultural settings of the SSA.

3.1.1 Physical Setting

The SSA in central Utah is an elongated teardrop-shaped 370-square-mile area in Utah and Juab counties, centered approximately 5 miles northwest of the town of Nephi in Juab County, in the Basin and Range portion of the Intermountain Plateau physiographic province of the United States.

The topography of the SSA consists of broad, flat valleys bordered by north-south slopes of the trending mountain ranges rising 4,500 to 6,000 feet above the valley floors. Two such valleys occur in the SSA: the Goshen Valley in the northern portion of the SSA, and the Juab Valley in the southeastern portion. Long Ridge, a relatively low southwest-northeast-trending ridge, separates the two valleys. Slopes on the valley floors are less than 10 percent, but slopes on the surrounding mountains are steep. Slopes in the Wasatch Mountains, beginning on the eastern edge of the SSA, exceed 30 percent. The Tintic Mountains, beginning on the western edge of the SSA, have gentler slopes, ranging from 10 to 30 percent. In the Goshen Valley, old lake terraces associated with prehistoric Lake Bonneville, the vastly larger precursor of the Great Salt Lake, occur at intervals up to 300 feet above the present lake surface (SCS, 1972; UCPC, 1980).

Geologically, the SSA is part of a deformed region in which Paleozoic sedimentary rocks were thrust eastward for tens of miles along gently dipping faults during the middle and late Mesozoic era. These gently dipping faults were intruded by igneous rocks in the Tertiary era, and subsequently broken by steeply dipping faults. This created the present pattern of alternating, north-south oriented mountains and valleys (Hunt, 1967).

The SSA lies within a band of high seismic activity that bisects central Utah in a north-south direction (King, 1977); the eastern boundary of the SSA is roughly tangent to the Wasatch Fault (Gurgel *et al.*, 1983). Historic seismic activity in the SSA has included five events up to magnitude VII on the Modified Mercalli (MM) scale, centered about 30 miles northwest of Nephi; five events up to MM magnitude V centered about 5 miles southwest of Nephi; and 40 events in an area between 8 and 23 miles south and southeast of Nephi. Three of these forty events, in 1876, 1961, and 1963, had MM magnitudes of VI (Howard *et al.*, 1978; Kinney, 1966; Stover, 1986; Stover *et al.*, 1986). Severe groundshaking is therefore to be expected in the area, although it should be insufficient to significantly damage well-built structures such as a GWEN tower (Manitakos, 1989).

Recoverable minerals in the SSA and adjacent mountains include geothermal and possibly coal resources, precious metals, and construction materials. Much of the SSA has potential for development of low-temperature (less than 90°C) geothermal resources (Gurgel *et al.*, 1983). The Deep Creek-Tintic mineral belt, which extends into the Tintic Mountains at the western edge of the SSA, has produced silver, lead, gold, copper, and zinc. Nonmetals such as argonite, gypsum, limestone, phosphate, and marble are also present. Sand and gravel deposits in the valleys now account for the largest tonnage of materials recovered each year (CURIC, 1985; UCPC, 1980). Oil and gas leases have been issued in the SSA, but no production has occurred, and the leases are now expiring. No mining or mineral leasing activity presently occurs near the CGSs (Rose, 1990a; Sperry, 1990), and the potential for mineral resources is low (Williams, 1990).

No paleontological sites are known in the SSA and the potential for discovery of such sites on the CGSs is low. Exposed sediments at the CGSs consist mainly of Quaternary

and Recent alluvium, so the discovery of paleontological sites is not expected (Hayden, 1990).

The soils of the CGSs are silt loams or sandy loams that are well drained and somewhat excessively drained soils of lake terraces and alluvial fans. Most are characterized by slopes of 2 to 4 percent. The pH values range from neutral to strongly alkaline (6.6 to 9.0). The erosion hazard at these soils is slight to moderate. Erosion in the area is caused by wind, not by water (SCS, 1984; Sevy, 1990). With the exception of the Winn/Carter site (CGS-6), the depth to the seasonally high water table is greater than 5 feet (SCS, 1984). None of the soils on the CGSs is hydric (SCS, 1987). None of the soils on the CGSs is classified as prime farmland; however, the Brough (CGS-2) and Bowles (CGS-7) sites contain soils that are classified as soils of state-wide importance (Allgood, 1991). The specific soils on each CGS are discussed in Sections 3.2 to 3.6 of this EA.

Permanent streams are rare in the SSA; no stream leaves the SSA because each of the valleys forms a closed basin. The northern portion of the SSA contains the southern end of Utah Lake, a 120-square-mile remnant of Lake Bonneville. The southeastern portion of the SSA contains Mona Reservoir, a 4-square-mile lake whose area and volume vary greatly in response to withdrawals for irrigation water (CURIC, 1985).

Drainage within the SSA is differentiated by distinct topographical basins. All runoff in the northern portion of the SSA drains into Utah Lake. Runoff in the southern portion drains into Mona Reservoir. Substantial quantities of groundwater are stored in aquifers in the alluvium at the base of the Wasatch Range. Most of the runoff and groundwater recharge originates in the mountains east of the SSA. The irrigation canals and wells are consequently concentrated east of Utah Lake in the Goshen Valley and in the eastern portion of Juab Valley (CURIC, 1985; UCPC, 1980).

Flooding is a significant hazard near the mouths of canyons located in the lower slopes of the mountainous regions on the east and west sides of the SSA (CURIC, 1985; UCPC, 1980). However, none of the CGSs is in a 100-year floodplain (Sevy, 1990). The

distances from each CGS to the nearest surface water or wetlands are given in Sections 3.2 through 3.6 of this EA.

The water is highly mineralized and surface waters contain high levels of dissolved solids. Sodium chloride, calcium and magnesium carbonates, nitrates, and sulfates account for most of the dissolved solids; concentrations of toxic substances such as arsenic and selenium are low. Copper concentrations in surface waters are typically less than 10 micrograms per liter (µg/l), although higher levels are reported near urban areas. Water hardness varies from soft to moderately hard (68 and 440 milligrams of calcium carbonate [$CaCO_3$] per liter [mg/l]) (UCPC, 1980).

The climate is semi-arid with cool winters and hot summers. Precipitation averages 17.7 inches per year and is fairly evenly distributed between the summer and winter months. Average monthly precipitation is 1.5 to 2.0 inches from October through May, and 0.8 to 0.9 inch in the summer. The growing season lasts 140 days in the valleys but drops rapidly with elevation and is as short as 20 days per year on the mountain peaks. Average daily maximum temperatures range from 38.5 °F in January to 91.7 °F in July (UCPC, 1980).

Air quality in the southern portion of the SSA is good and does not exceed the National Primary and Secondary Ambient Air Quality Standards, which are enforced by the State of Utah (Utah Air Conservation Regulations 3.1.8). However, the areas near Provo, 7.5 miles northeast of the SSA, are non-attainment areas for particulate matter (Broadhead, 1990). The Mount Nebo Uinta Wilderness Area at the eastern edge of the SSA is a Class I Air Quality Area (42 United States Code [USC] 7472). Air quality standards are discussed in Section 3.3.3, pages 3.3-1 to 3.3-7 of the FEIS.

3.1.2 Biological Setting

Irrigated croplands and orchards cover most of the Goshen Valley east of Utah Lake and the eastern portion of Juab Valley. Shrublands dominated by saltbrush, greasewood, and sagebrush prevail in the western and southern portions of both valleys and the gently sloping alluvial fans bordering them. These vegetation types are abruptly

replaced by juniper and pinyon pine woodlands at the transition from alluvial fans to the lower slopes of the mountains. The pinyon-juniper communities are replaced, in turn, at still higher elevations by mountain mahogany and oak scrub, and they, in turn, are replaced with spruce and fir forests (Küchler, 1964; UCPC, 1980).

The *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (GPO 1989-236-985/00336) states that an area must meet three criteria to be designated as a wetland: hydric soils; hydrophytic vegetation; and wetlands hydrology, which includes a shallow water table and standing water for at least 7 days of the growing season (FICWD, 1989). This manual was used as the basis for wetland determination. Based on the field investigation (Buxton, 1990), and published soils data (SCS, 1984; SCS, 1987), none of the CGSs meets these three criteria, nor do the areas within 300 feet of the CGSs. However, the SSA does contain several square miles of wetlands. These wetlands are found along the western and southern edges of the southernmost part of Utah Lake, in a band extending southward from Utah Lake to the town of Goshen, and in areas south of, and along the eastern edge of, Mona Reservoir (SCS, 1984).

The wetlands adjacent to Utah Lake are heavily used by waterfowl. These wetlands contain nesting and feeding sites for duck, Canada goose, snowy egret, black-crowned night heron, and great blue heron; and feeding grounds for cattle egret, double-crested cormorant, white pelican, white-faced ibis, and various other shorebirds (Nelson, 1990). The principal species of waterfowl nesting near Utah Lake are Canada goose; and mallard, pintail, cinnamon teal, northern shoveler, gadwall, green-winged teal, and redhead ducks. The principal shorebirds nesting near Utah Lake are the snowy egret, great blue heron, cattle egret, ibis, black-crowned night heron, and cormorant (UCPC, 1980). In all, 308 species of birds, including 82 species of waterbirds, have been reported from central Utah as transients, summer residents, or migrants (Nelson *et al.*, undated). Of these, 45 species of waterbirds, including 27 species of waterfowl, 15 species of shorebirds, and 3 species of gulls, are reported from Juab County (CURIC, 1985). However, most of these 308 species are found near water or in woodlands, and relatively few of them are to be expected in the sagebrush and grass-covered fields near the CGSs. Species likely to be found on or near the CGSs include passerines such as the ash-throated flycatcher, gray flycatcher, horned lark, raven, Bendire's thrasher,

northern shrike, loggerhead shrike, western meadowlark, lapland longspur, and the lark bunting (CURIC, 1985; Nelson *et al.*, undated).

Upland game birds are also abundant in the SSA, although only ring-necked pheasants are regularly encountered on the valley floor. Ring-necked pheasants occur throughout the lowlands of the SSA, chukar partridges occur on the lower slopes, and ruffed grouse and sage grouse occur throughout the mountains (CURIC, 1985; UCPC, 1980).

Raptors are abundant in the SSA. Ninety raptor nests, including 61 golden eagle nests, 1 bald eagle nest, 12 owl nests, and 16 nests of hawks, kestrels, and harriers, are listed in the Utah Division of Wildlife Resources databas Most of these nests are in the rugged mountain terrain along the eastern and western sides of the SSA and in the Long Ridge through the SSA's center. However, 1 golder eagle nest, 2 ferruginous hawk nests, and 1 red-tailed hawk nest appear on or near the power lines 1.0 mile west of the Steadman (CGS-8) and Millerberg (CGS-9) sites (Nelson, 1990). All of the CGSs are at least 1 mile from the nearest ferruginous hawk nest. All CGSs are at least 2 miles from the nearest golden eagle or owl nest.

Elk, deer, and pronghorn antelope comprise the principal large game found in the valleys and on the lower slopes of the mountains. Small numbers of mountain lions and black bears are also present. Small game animals, primarily cottontail rabbits and jackrabbits, are abundant throughout the SSA, as are a number of non-game species such as ground squirrels, pocket gophers, voles, and other rodents and their predators, particularly foxes and coyotes. Mink, raccoon, and beaver occur along the principal streams of the Wasatch Range. Skunk, badger, ringtailed cat, and long-tailed weasel are found throughout the SSA. Muskrats occur in the wetlands and irrigation ditches. Marmots occur throughout the Wasatch Range. Eight species of bats are also found in the SSA (CURIC, 1985; Nelson *et al.*, undated; UCPC, 1980).

Game fish include both warm- and cold-water species, with the former dominating the catch from Utah Lake. The streams draining the Wasatch Range contain brown, cutthroat, rainbow, and brook trout, and mountain whitefish (UCPC, 1980). Mona

Reservoir has few fish because the extensive fluctuations in water levels inhibit successful reproduction (CURIC, 1985).

In compliance with Section 7 of the Endangered Species Act of 1973, as amended (16 USC 1531, *et seq.* at 1536), lists of threatened and endangered species that could occur in the area of the SSA were obtained during informal consultations with the U.S. Fish and Wildlife Service (USFWS) (Appendix C, Johnson, 1990, 1992, pages C-3 through C-6, and C-12 to C-13 of this EA; Appendix C, Williams, 1993, pages C-14 to C-15 of this EA). According to the latest list, five species federally listed as endangered or threatened were identified as possibly occurring in the SSA: the peregrine falcon (*Falco peregrinus*), the bald eagle (*Haliaeetus leucocephalus*), June sucker (*Chasmistes liorus*), Ute ladies'-tresses (*Spiranthes diluvialis*), and the Utah valvata snail (*Valvata utahensis*).

In addition, 11 federal candidate species could occur in the SSA:

Ferruginous hawk	*Buteo regalis*
Loggerhead shrike	*Lanius ludovicianus*
Western snowy plover	*Charadrius alexandrinus nivosus*
White-faced ibis	*Plegadis chihi*
Black tern	*Chlidonias niger*
Western least bittern	*Ixobrychus exilis hesperis*
Spotted frog	*Rana pretiosa*
Utah hydroporus diving beetle	*Hydroporus utahensis*
Pygmy rabbit	*Brachylagus idahoensis*
Deseret milk-vetch	*Astragalus desereticus*
Tidestrom beardtongue	*Penstemon tidestromii*

The peregrine falcon and bald eagle may occur on the sites as transient or foraging individuals, but no trees or cliffs suitable for roosting or nesting are present on the CGSs. The June sucker is a fish and requires an aquatic habitat; Ute ladies'-tresses is an orchid restricted to wetlands (England, 1992); and the Utah valvata snail has external gills and requires an aquatic habitat (Pennak, 1989). The CGSs contain no water or wetlands.

The ferruginous hawk and loggerhead shrike may forage near the CGSs, but nesting habitat is absent from the CGSs. The western snowy plover and the white-faced ibis (both shorebird species) may migrate over the CGSs, but they forage and nest in wetland habitats not found on the CGSs (Tuhy, 1990). The black tern nests in marshes and forages in open meadows, marshes, and freshly plowed fields; the western least bittern nests and forages in wetland habitat (Ehrlich et al., 1988). Neither bird would be expected in the grassland vegetation of the CGSs. The spotted frog and the Utah hydroporus diving beetle are aquatic species that require marshes or permanent ponds or streams for breeding, habitat that is absent from the CGSs. The pygmy rabbit is essentially a species of the deserts of the Great Basin, although it requires moist soils in which to make its burrows. It feeds primarily on sagebrush (Burt and Grossenheider, 1976; Ransom, 1981; Thomas, 1979). The CGSs contain neither sagebrush habitat nor moist soils.

The Deseret milk-vetch and Tidestrom beardtongue, two candidate plant species, are unlikely to be present on any of the CGSs because of their known distribution and habitat requirements. According to the database of the Utah Natural Heritage Program, the closest occurrence of these plants is Tidestrom beardtongue, which grows on the slopes of Mount Nebo. However, it is not expected to be found growing in the valleys west of Nephi and Mona (Tuhy, 1990).

Utah state-listed endangered, threatened, and candidate vertebrate species are identical to the federal list (Jones, 1993; Sadler, 1991). Utah maintains no lists of endangered, threatened, and candidate invertebrate or plant species (Tuhy, 1991).

3.1.3 Socio-Cultural Setting

Human occupation began in the SSA over 10,000 years ago when nomadic peoples following large game hunted in the area. The change to settled year-round villages took place about 1,500 years ago. Evidence of the Fremont culture (A.D. 500 to 1250), identified by pottery-making skills, agricultural practices, and use of the bow and arrow, has been found in the SSA. Around A.D. 1300, nomadic Shoshoni tribes moved into the

area. The western branch of the Shoshoni, the Goshute, settled in the Great Basin (Weir, 1989) and was followed in historic times by the Utes and Paiutes (Hauck, 1990).

Recorded Euro-American excursions into the region began with the explorations, between 1767 and 1781, of the southern portions of the Great Basin by Father Francisco Tomas Hermengildo Garces, a Franciscan priest (Hauck, 1990). The route he pioneered was used in 1775 by Spanish exploration parties bound for California and became known as the "Old Spanish Trail" (WPA, 1941). In 1826, Jedediah Smith began exploration of the Great Basin; U.S. Government-supported exploration began with the Fremont expeditions in the 1840s. Mormon settlers arrived in the Great Salt Lake Valley in 1847 and eventually opened a trail from Salt Lake southward through the project area to Las Vegas and Los Angeles (Hauck, 1990).

The U.S. Congress created the Territory of Utah in 1850. Nephi, originally a walled town surrounded by a moat, was founded in 1851; Goshen was founded in 1856 (WPA, 1941).

Mormon stockherders began grazing cattle in the valleys of the Tintic Mountains, long a homeland for the Utes, in the early 1850s (Weir, 1989). This encroachment was bitterly resented by Tintic, a Ute chief, who waged a guerilla campaign against the Mormons throughout the 1850s until his death in 1859 (WPA, 1941).

Mining began with a silver rush in 1869, when George Rust, a non-Mormon cowboy discovered a "funny looking" piece of rock (Weir, 1989). Mining camps, extracting silver, gold, copper, lead, and zinc, sprang up all over the mountains in the early 1870s (WPA, 1941).

The Utah Southern Railroad reached the Tintic district in the 1870s and a branch line of the Rio Grande Western, now the Denver and Rio Grande Western Railroad, was built in 1891 (WPA, 1941). New discoveries kept the area booming until the 1930s when the high cost of ore extraction closed most of the mines. The eastern Tintic Mountains are now a designated historic district where much can still be seen of the area's rich history--abandoned mine heads, empty shafts and glory holes, ore tailings, and scattered ghost towns (Weir, 1989).

In accordance with the National Historic Preservation Act (16 USC 470, *et seq.*), the Utah State Historic Preservation Officer (SHPO) was consulted to determine the probability of unidentified historic properties being affected by the project. A number of surveys had been conducted in Juab and Utah counties, but the Utah SHPO noted that information about the area was limited and stated that additional cultural resources might be identified (Appendix C, Dykman, 1990, page C-9 of this EA). Although the Utah SHPO did not specifically request that a study be conducted, the Air Force elected to conduct an archaeological and historic structures survey.

In October and November 1990, a Phase I archaeological survey was conducted, consisting of a literature and records search and an on-site survey of the CGSs. The records search revealed one previously recorded potentially eligible archaeological site within 1.5 miles of two CGSs. The archaeological site is potentially eligible for the National Register of Historic Places (NRHP). The site is within 1 mile of CGS-8 and CGS-9. The site (42UT396), an ancient campsite of the Fremont culture, has no standing structures, and therefore is not subject to potential visual impacts from construction of a GWEN tower. The on-site survey of all five CGSs was conducted by a professional archaeologist qualified in the State of Utah using pedestrian transects at 10- to 20-meter (approximately 33- to 66-foot) intervals. No archaeological resources were identified on any of the CGSs (Hauck, 1990). Although CGSs -8 and -9 were moved 100 feet farther from State Highway 68 after the archaeological survey had been completed, the relocated CGSs are not expected to contain significant archaeological resources (Hauck, 1991).

For reasons discussed in Section 4.8.1.3, beginning on page 4.8-2 of the FEIS and Section 4.1.3 of this EA, historic properties within 1.5 miles of the CGSs are potentially subject to adverse visual impacts from the relay node facility. More than 130 properties in Juab and Utah counties are listed on the NRHP, but all of these are in towns or in the Tintic Historic District, which is located in the Tintic Mountains at the western edge of the SSA (NRHP, 1989). None is within 1.5 miles of a CGS. A reconnaissance survey was conducted, consisting of a records search of all historic properties within 1.5 miles of the CGSs, driving all accessible roadways within 1.5 miles of the CGSs, and examining

inaccessible localities through binoculars. The properties were then evaluated for their potential eligibility for the NRHP. The historic structures survey identified no potentially eligible NRHP properties within 1.5 miles of the CGSs (Hauck, 1990).

In compliance with the American Indian Religious Freedom Act of 1978 (42 USC 1996), the Bureau of Indian Affairs (BIA) was consulted in order to locate tribes associated with the project area (Crosier, 1992). At BIA recommendation, four tribal organizations were written representing the Ute, Skull Valley Goshute, Paiute, and Goshute tribes. These tribes were notified, the GWEN project was explained, and information was requested regarding traditional, religious, or sacred sites located within the SSA. Representatives of the Paiute Tribe of Utah, the Goshute Indian Tribe of Utah, and the Skull Valley Goshute responded and expressed no concerns about the GWEN project (Anderson, 1990; Harrison, 1991; Quintana, 1991). No response has been received from the Ute Tribe to letters or several attempts at phone communication.

Land use in the area is primarily a mixture of agriculture and recreation. Irrigated farmland occupies the lower-lying areas east and south of Mona Reservoir and east of Utah Lake. Although Utah County is highly populated and residential, 33 percent of the land area is farmland compared to 12 percent in Juab County (Census Bureau, 1988). Much of the land area in Utah County is mountainous and cannot be cultivated, and is therefore used for grazing, livestock (primarily chickens), and small timber harvests. The areas of prime agricultural land are reserved for the cultivation of apple, pear, and cherry orchards and crops such as corn, wheat, barley, alfalfa, and sugar beets (UCPC, 1980). The Federal Government controls 72 percent of the total land area in Juab County (CURIC, 1985). Four of the five CGSs are zoned Agricultural (Greenhalgh, 1990; Rose, 1990a), and one (Millerberg, CGS-9) is zoned for Mining and Grazing (Rose, 1990a). Zoning is determined by each county, and zoning on all five CGSs would be consistent with a GWEN facility (Greenhalgh, 1990, 1992; Rose, 1990a, 1992).

Recreational uses include boating and fishing on Utah Lake, which is 2 miles east of the nearest CGSs (CGSs-8 and -9), and camping and hunting in the Uinta National Forest, at the southeastern edge of the SSA, 3.5 miles east of the nearest CGS (CGS-7) (UCPC, 1980; Weir, 1989). The Mount Nebo Uinta Wilderness Area, 5 miles east of the nearest

CGS, provides opportunities for hiking, backpacking, and horseback riding in the summer and cross-country skiing in the winter (Weir, 1989). No wild or scenic rivers occur in the SSA (Greenhalgh, 1990; Rose, 1990a).

The main highways through the SSA are U.S. Highway 15 and State Highway 28, which run roughly north-south through the SSA; State Highway 132, which runs east-west through the southern portion of the SSA; and U.S. Highway 6, which runs east-west across the northern portion of the SSA. None is designated a state scenic highway (Greenhalgh, 1990; Rose, 1990a). However, U.S. Highway 6, 6 miles south of the nearest CGS (CGS-9), provides the principal access to the Tintic Historic District (Rose, 1990b). The major access to the Mount Nebo Uinta Wilderness Area is 6 miles east of Nephi along State Highway 132. The SSA is served by the Nephi Municipal Airport, 1.5 miles northwest of Nephi, and the Spanish Fork Airport, 18 miles northeast of Goshen. Rail service is provided by the Denver and Rio Grande Western Railroad in the northern portion of the SSA and the Union Pacific Railroad in the southern portion of the SSA.

Sources of ambient noise are limited primarily to the operation of farm equipment and traffic. As described in Section 3.5.3, page 3.5-1 of the FEIS, local ordinances typically set maximum noise level limits of 70 to 75 dBA for land under agricultural uses. Neither Utah County nor Juab County has local noise ordinances (Rose, 1990a; Greenhalgh, 1990). Juab County specifies local noise impact zones, but none of the CGSs is located in these zones (Greenhalgh, 1990).

Although Juab and Utah counties share common borders, they differ greatly from one another. Juab County is rural and sparsely inhabited, while Utah County is, by comparison, suburban and densely populated. Although the land area of Juab County is approximately 70 percent larger than that of Utah County, the population of Utah County is approximately 50 times that of Juab County. In 1986 the population of Juab County totaled 5,900 with the largest population concentrated in Nephi (3,300). That same year Utah County's population topped 240,500 with the largest urban centers being Provo (79,700) and Orem (61,600). The combined population of the two counties totaled 246,400 in 1986, a level which has increased by 10.2 percent since 1980 (Census Bureau, 1988). Population concentrations in the SSA include Nephi, Genola

(population 630), Goshen (population 582), and Mona (population 536) (Rand McNally, 1990).

The economies of the two counties differ considerably. The primary areas of employment in Juab County are retail trade and service industries, with automotive dealers, service stations, and health services experiencing the greatest concentrations. The labor force concentrations in Utah County are in the service and retail areas with health services, business services, and eating establishments being the largest employment industries. Mining is a significant industry in the region and has played a historical role in the growth and development of the region. The electronics and computer manufacturing industry is relatively new to the region but has become a significant force in the development of the local economy (Census Bureau, 1987). The 1984 per capita personal income differed slightly between Juab and Utah counties, $7,147 and $7,287, respectively, and was below the state level of $9,715 and the national level of $12,772. The 1986 rate of unemployment in Juab County (15.7 percent) was approximately 2.5 times that of Utah County (6.4 percent). Both rates were higher than the state level of 6.0 percent (Census Bureau, 1988).

The visual setting of the area is a combination of natural and rural elements. On the eastern and western borders of the SSA, the Tintic and Wasatch mountains are the principal elements, rising dramatically as much as 6,000 feet above the valley floor. Low hills, such as Long Ridge through the center of the SSA, provide other topographic relief. Utah Lake and Mona Reservoir also provide visual interest. The vegetation, mostly low shrubs and grasses, plays a subtle role, affecting primarily the coloration of the landscape. The steeper slopes and ridgetops of the lower hills are forested or covered with open woodlands of pinyon, and the mountain slopes are forested. Both are generally free of man-made structures. Any man-made structures that do exist are generally subordinate to the surrounding natural features, except in the towns or more populated areas. The gentler slopes are used primarily as farmland and pasture. The complexity of the skyline is generally low to moderate, as defined in Section 4.8.1.3, page 4.8-10 of the FEIS.

3.2 Alternative 1: Brough Site (CGS-2)

The Brough site contains Nephi silt loam, a deep, well-drained soil of alluvial fans. The soil is mildly alkaline to strongly alkaline (pH 7.4 to 9.0). Permeability is slow, and runoff is medium. The depth to the seasonally high water table is more than 5 feet. Erosion hazard is slight (SCS, 1984). The soil is classified as a soil of state-wide importance, but is not classified as prime farmland (Allgood, 1991) and is not hydric (SCS, 1987).

The site is on ground that slopes slightly to the north and west with 0 to 2 percent slopes. The nearest surface water is an intermittent stream, 0.4 mile west of the CGS, that discharges into West Creek, 2 miles west of the CGS.

This site and adjacent lands are agricultural and are being used as rangeland or for forage production. The CGS has been tilled and planted to grass. Native vegetation and wildlife habitat are absent from the site.

The most prominent features visible from the site are the peaks of the Wasatch Range to the east, the low, pinyon-covered hills about 1.5 miles west of the site, a steel tower-supported transmission line along the base of the hills, and the three-phase power line along the northern side of the site. U.S. Highway 15 is 0.8 mile southeast of the site.

The nearest residential area is Nephi, 2.75 miles northeast.

3.3 Alternative 2: Winn/Carter Site (CGS-6)

The Winn/Carter site contains Modoc fine sandy loam, a moderately deep, well-drained soil of alluvial fans derived primarily from igneous rocks. A silica cemented hardpan occurs at a depth of 20 to 40 inches. The depth to the seasonally high water table is 20 to 40 inches. Permeability is moderately slow and runoff is medium. The soil is neutral to moderately alkaline (pH 6.6 to 8.4). Erosion hazard is slight (SCS, 1984). The soil is not classified as prime farmland (Allgood, 1991) and is not hydric (SCS, 1987).

The site is on the upper slopes of the broad alluvial fan at the base of Long Ridge, the range of low hills that bisects the center of the SSA. Slopes are 4 percent. The nearest surface water is an intermittent stream 150 feet southeast of the southeastern corner of the CGS, 325 feet from the edge of the ground plane.

The vegetation consists of desert shrubs and grasses. Pocket gopher mounds are common on the site. Adjacent lands are agricultural, being used as rangeland or for forage production.

The southern end of Mona Reservoir is 1.3 miles northeast of the site. The views are dominated by the pinyon-covered hills of Long Ridge to the west, the rugged peaks of the Wasatch Range to the east, and Mona Reservoir to the northeast. U.S. Highway 15 is 3.2 miles east of the site.

The nearest residential area is Mona, 1.8 miles east.

3.4 Alternative 3: Bowles Site (CGS-7)

The Bowles site contains Nephi silt loam, which is described in Section 3.2 of this EA. This soil is classified as a soil of state-wide importance, but is not classified as prime farmland (Allgood, 1991) and is not hydric (SCS, 1987). The depth to the seasonally high water table is more than 5 feet (SCS, 1984).

The site is on a gently sloping alluvial fan at the base of the Wasatch Range, which has 1 to 2 percent slopes to the northwest. The nearest surface water is an intermittent stream 600 feet west of the site.

This site has been plowed and planted to grass. Adjacent lands are also agricultural, being used as rangeland or for forage production.

The most prominent features visible from the site are the Wasatch Range, the base of which begins to rise 1 mile to the east, and the low, pinyon-covered hills about 2.5 miles west of the site. U.S. Highway 15 is 0.3 mile southeast of the site.

The nearest residential area is Nephi, 1.9 miles to the northeast.

3.5 Alternative 4: Steadman Site (CGS-8)

The Steadman site contains Medburn fine sandy loam, a deep, well-drained soil. The soil is moderately alkaline to strongly alkaline (pH 7.9 to 9.0). Permeability is moderately rapid and runoff is slow. The depth to the seasonally high water table is more than 5 feet. The hazard of water erosion is moderate (SCS, 1984). The soil is not classified as prime farmland (Allgood, 1991) and is not hydric (SCS, 1987).

The site is on an eastward sloping alluvial fan approximately 2 miles west of the southern end of Utah Lake. Slopes are 1 to 2 percent. The nearest surface water is an intermittent stream 1,130 feet to the northwest.

Vegetation on the site is grazed grassland. Pocket gopher mounds are abundant. Adjacent lands are also agricultural, being used as rangeland or for forage production.

The main natural features of the visual environment are the Tintic Mountains to the west and the Wasatch Range to the east. The main man-made features are State Highway 68 on the eastern edge of the site, associated power lines, and a transmission line to the west.

The nearest residential area is Genola, 5.1 miles to the southeast.

3.6 Alternative 5: Millerberg Site (CGS-9)

The Millerberg site contains Medburn fine sandy loam, Genola silt loam, and Linoyer very fine sandy loam. These soils are mildly alkaline to strongly alkaline (pH 7.4 to 9.0). These are deep to very deep, well-drained soils with moderate permeability, slow to medium runoff, and slight to moderate erosion hazard (SCS, 1984). The depth to the seasonally high water table is more than 5 feet. These soils are not classified as prime farmland (Allgood, 1991) and are not hydric (SCS, 1987).

The site is on an eastward-sloping alluvial fan approximately 2 miles west of the southern end of Utah Lake. Slopes are 1 to 2 percent. The nearest surface water is an intermittent stream 1,260 feet to the south.

Vegetation on the site is grazed grassland. Pocket gopher mounds are abundant. Adjacent lands are also agricultural, being used as rangeland or for forage production.

The main natural features of the visual environment are the Tintic Mountains to the west and the Wasatch Range to the east. The main man-made features are State Highway 68 on the eastern edge of the site, associated power lines, and a transmission line to the west.

The nearest residential area is Genola, 5 miles to the southeast.

4.0 ENVIRONMENTAL CONSEQUENCES OF ACTION ALTERNATIVES

This section discusses the potential impacts of the GWEN project on the environmental setting of the five CGSs in central Utah. Several impacts that would be common to some or all of the action alternatives are discussed in Section 4.1 of this EA. Impacts that are unique to each action alternative are discussed in Sections 4.2 through 4.6 of this EA. There would be no significant impacts at any of the sites.

4.1 Common Features

Presented below is information on the physical, biological, and socio-cultural impacts common to some or all of the action alternatives.

4.1.1 Physical

Impacts from **construction** activities would not be significant. Construction would require localized earth-moving, including excavation and backfilling for placement of foundations and guy-wire anchors. Less than 3,800 square feet would be covered with concrete and gravel for the tower base and the equipment area enclosures. Similar coverage would be required for on-site access roads and parking; incidental activities during construction would disturb a similar amount. In total, about 0.25 acre would be occupied by foundations and the on-site access roads. Construction of the off-site access road and installation of utility lines would cover less than 840 square feet and have no significant impacts.

The ground plane would be installed using machines that bury wire approximately 1 foot below the surface with minimal disturbance of the soil surface. This process would require moving a small tractor or similar equipment over much of the 11-acre site, but it would not significantly disturb the existing vegetation or create a significant erosion hazard.

Impacts to **mineral resources** would be minor, as indicated in Section 4.1.1.4, page 4.1-2 of the FEIS. There are several mineral resources in the SSA, including geothermal

resources, silver, lead, gold, copper, zinc, argonite, gypsum, limestone, phosphate, marble, sand, gravel, and possibly coal (CURIC, 1985; Gurgel *et al.*, 1983; UCPC, 1980). However, no mining or mineral leasing activity presently occurs near the CGSs (Rose, 1990a; Sperry, 1990), and the potential for mineral resources in those areas is low (Williams, 1990). If any resources are present under a site, development of that site would only deny access to a small portion of those resources for the lifetime of the project and would not result in any significant impact.

Impacts on **paleontological resources** are not anticipated. No fossil sites are known in the SSA, and the exposed sediments at the CGSs consist mainly of Quaternary and Recent alluvium, so the discovery of paleontological sites is not expected (Hayden, 1990). However, if any fossils are found during construction, work that might affect them will be suspended while the Utah State Historical Society is notified and the significance of the find is evaluated.

Erosion and increase in storm water runoff would not be significant. All sites have slopes of 4 percent or less, so any required grading to level the site would be minimal. In addition, the soils are not subject to high erosion hazards and standard measures for erosion control would be used during and after site construction. Sites currently in agricultural use will be replanted after construction is finished; sites with desert vegetation will be restored to preexisting natural vegetation.

No CGS lies within a **100-year floodplain** (Sevy, 1990).

No **prime farmland** would be removed from production for the project, as none of the sites contains designated prime farmland; however, two CGSs (Brough, CGS-2, and Bowles, CGS-7) have a soil classified as a soil of state-wide importance (Allgood, 1991).

Impacts on **drinking water** are not expected because corrosion of the ground plane is not anticipated to raise copper concentrations in any aquifer or surface water body by more than 20 µg/l as noted in Sections 3.2.4.1 and 4.2.1.1, pages 3.2-2 and 4.2-3 of the FEIS. This would represent 2 percent of the maximum allowable copper concentrations permitted by the State of Utah for raw water sources for potable water supply (Utah

Drinking Water Rules, Utah Administrative Code Rule 449, Environmental Health, Drinking Water, and Sanitation, as amended through January 1, 1991).

Impacts on **surface water or wetlands** that support aquatic plants and animals could occur when the site is less than 300 feet from surface water or wetlands, if the soil is acidic, or the depth to the seasonally high water table is less than 3 feet from the ground plane (4 feet from the surface), as discussed in Section 4.2.1.1, page 4.2-3 of the FEIS. Impacts are not expected at any of the CGSs because there is no surface water within 300 feet of the ground plane.

Impacts on **air quality** would not be significant. Temporary but insignificant increases in air pollutant emissions, including fugitive dust, would occur during construction, primarily from greater use of heavy machinery than would be required in normal farming operations. During operation of the BUPG at 100 percent load, total yearly emissions from the BUPG would be less than 350 pounds per pollutant, as described in Section 2.1.2 of this EA. These are well below the standards set by the State of Utah (Utah Air Conservation Regulations, as revised), which requires permits for facilities emitting any single regulated substance at the rate of 1 ton per year. The emissions from the BUPG would have no impact on the air quality in the Mount Nebo Uinta Wilderness Area because it is 5 miles from the nearest CGS. Hence, the project would not result in the violation of Primary and Secondary Ambient Air Quality Standards. Permits will not be required under Utah Air Conservation Regulations (Seeby, 1990).

4.1.2 Biological

Impacts on **wildlife and wildlife habitats** would not be significant because the CGSs are either agricultural fields or grazed rangeland typical of the region. No critical or exceptionally valuable wildlife habitats would be at risk because the CGSs are located outside the winter range of elk, deer, and pronghorn (Nelson, 1990). Further, as stated in Section 3.1.2 of this EA, none of the sites is within 300 feet of a wetland.

Bird collisions with the tower may occur but are not expected to be significant. Section 4.4.1.5, page 4.4-5 of the FEIS states that the majority of bird collisions occur

in adverse weather conditions when the visibility of man-made structures is obscured and birds may be forced to lower their flight level. However, visibility in the SSA is generally good (DOE, 1980). Generally, songbirds (passerines) are more likely to collide with a tower or the guy wires than are raptors or waterfowl (Avery *et al.,* 1980). Although the entire SSA is within a broad migration corridor for waterfowl and other birds and is potential foraging territory for golden eagles and other raptors, areas with high concentrations of bird flight activity, such as feeding and nesting habitats, prominent topographical features that could serve as navigational aids, local flight corridors, and raptor roosting areas, were avoided.

The SSA is within a broad migration corridor used by waterbirds, passerines, and other migrants of the mountain west. The corridor is variously designated a part of either the Pacific Flyway or the Central Flyway. However, only a relatively modest portion of each flyway passes through the SSA (USFWS, 1971). For example, although 3 to 5 million waterfowl pass through the Great Salt Lake area (which is north of the SSA) during the spring and fall migrations, only 300,000 to 800,000 continue southward across the SSA (Bellrose, 1980). The CGSs are located outside corridors of local movement, such as areas between lakes and grainfields.

Two CGSs (Steadman, CGS-8, and Millerberg, CGS-9) are approximately 2 miles west of the southern end of Utah Lake, which is an area of heavy usage for nesting and foraging by waterfowl and wading birds. These sites lie between the Tintic Mountains, which have numerous golden eagle and ferruginous hawk nest sites, and Utah Lake, a potential foraging area. However, both of these species prey mainly on small mammals (Ehrlich *et al.,* 1988). Thus, a tower at these sites would not lie in a heavily used flight path between nest sites and feeding areas. Similarly, a tower at either CGS would not adversely impact the waterbirds concentrated at the southern tip of Utah Lake, because both CGSs are well to the west of the lake and are in the midst of desert rangeland which offers no forage for these species.

One CGS (Winn/Carter, CGS-6) is approximately 4 miles west of Mona Reservoir, which is also waterfowl habitat and is between the golden eagle nest sites on Long Ridge and the reservoir. However, golden eagles prey mainly on small mammals rather than birds

(Ehrlich *et al.*, 1988). Thus, a tower at these sites would not lie in a defined flight path between nest sites and feeding areas. The only bald eagle nest in the SSA is just east of Mona Reservoir (Nelson, 1990) but is more than 1.5 miles from the CGSs; therefore no impact is expected. Similarly, a tower at this CGS would not adversely impact waterbirds using the Mona Reservoir because the CGS is well to the west of the lake and is in the midst of rangeland which offers no forage for these species.

Moreover, the setbacks of all five CGSs from these two large water bodies should be sufficient to prevent significant risk of collisions to waterbirds because the CGSs are in unirrigated areas that would offer little forage for migratory waterbirds. Risks to other birds, both residents and migrants, are also low, for the reasons outlined in the preceding paragraphs.

No federally listed **threatened or endangered species** would be affected. This determination was made after informal consultation with the USFWS in compliance with Section 7 of the Endangered Species Act of 1973 as amended (16 USC 1531, *et seq.*, at 1536) (Appendix C, Johnson, 1991, pages C-7 to C-8 of this EA; Appendix C, Williams, 1993, page C-16 of this EA). The USFWS also concurred in 1991 that none of the 31 candidates listed at that time would be affected. In 1993, five new candidate species were added to the list but none of these species would be affected, primarily because their habitats are absent from the CGSs. The spotted frog requires a wetland habitat, which is absent from the CGSs (Thomas, 1979). The black tern breeds in wetlands, and the western least bittern breeds and forages in wetlands (Ehlich *et al.*, 1988), so neither are expected on the CGSs, which are grasslands. The pygmy rabbit requires sagebrush habitat for foraging and moist soils in which to make its burrows (Burt and Grossenheider, 1976; Ransom, 1981; Thomas, 1979). The CGSs contain neither of these habitats, so the pygmy rabbit would not be affected.

Only the loggerhead shrike would be likely to forage near the CGSs. The shrike nests near water, which is at least 2 miles from any CGS, but its foraging habitat is open country with sparse vegetation of low shrubs and herbs where it forages for insects, small mammals, and small birds. Its foraging behavior, which consists of short, straight flights from nearby perches, is expected to lower the probability of a shrike colliding with

a guy wire, the major risk from a GWEN tower. In addition, the wires closest to the ground, which pose the greatest risk to the shrike during foraging, are spaced more widely apart.

4.1.3 Socio-Cultural

Local employment would be increased slightly, primarily through use of local subcontractors for earth-moving and possibly for some of the facility's maintenance.

Impacts on **community support systems** would not be significant because the relay node will be unmanned and will use modest amounts of power (comparable to that used by an average single-family house). Security needs will be met through agreements with local police officials to monitor the integrity of the site during routine patrols, as detailed in Section 4.6.1.1, page 4.6-1 of the FEIS.

Impacts on **land use** would not be significant. All sites are zoned Agricultural or Mining and Grazing. A GWEN facility would be permitted under existing zoning codes (Greenhalgh, 1990; Rose, 1990a). Care was taken in the site selection process to maintain setbacks from institutional uses such as schools, churches, recreational areas, and areas zoned residential. The tower would not significantly affect property values because non-noxious, nonresidential land uses, such as the proposed relay node, have no systematic effect on housing values, as stated in Section 4.7.1.3, page 4.7-8 of the FEIS.

Construction **noise** impacts would be temporary and insignificant. Operational noise from the backup generator would be less than 72 dBA at the site boundary. At 50 feet beyond the site boundary the noise level would drop below 65 dBA, as discussed in Section 2.1.2 of this EA. Neither Utah nor Juab County has any local noise ordinances (Greenhalgh, 1990; Rose, 1990a). Although the counties do not set any noise levels, the noise level generated at the site would be within the standards typically set for residential and mixed residential/agricultural use (55 to 65 dBA), as stated in Section 3.5.3, page 3.5-2 of the FEIS. In addition, the BUPG would only operate at this noise level for 2 hours per week during testing and during commercial power outages.

Impacts on **public health and safety** would not be significant, as discussed in Sections 4.11 and 4.12, beginning on pages 4.11-1 and 4.12-1, respectively, of the FEIS. Shock and burn risks would be associated with the buildup of electrical charges on ungrounded metallic objects inside the inner exclusionary (8-foot) fence located approximately 20 feet from the tower base. However, a grounded person within the outer exclusionary (4-foot) fence located approximately 330 feet from the tower base who touches an ungrounded object while the tower was transmitting would experience only a mild shock, sufficient to cause the individual to break contact but not cause harm. Furthermore, because the transmission periods would total between 6 and 8 seconds per hour during normal operations, the risk of even these mild shocks would be insignificant. Only a determined effort to enter the inner exclusionary zones, within the 8-foot fence, would put a person at increased risk of higher shock and a higher specific absorption rate, dependent on the period of prolonged grasping contact with an ungrounded metallic object. Fire hazards at the relay node facility would be low, as discussed in Section 4.12.1.1, page 4.12-1 of the FEIS. Radio-frequency emissions would not cause adverse health effects, as discussed in Section 4.4.1.6, pages 4.4-6 and 4.4-7 of the FEIS. Subsequent to the publication of the FEIS, further study confirmed the conclusion of the FEIS that there is no evidence of adverse effects of GWEN radio-frequency emissions on public health (NRC, 1992).

The relay node would operate in the LF band and therefore would not interfere with pacemakers, emergency communications, commercial and amateur radios, televisions, or garage door openers, as noted in Section 2.1.1.1, page 2-3 of the FEIS.

Impacts on **archaeological resources** would not be significant because no archaeological resources were found on the CGSs during the on-site survey (Hauck, 1990). Although CGSs -8 and -9 were moved 100 feet farther from State Highway 68 after the archaeological survey had been completed, the relocated CGSs are not expected to contain significant archaeological resources (Hauck, 1991). The Utah SHPO concurs with the findings (Appendix C, Dykman, 1991, pages C-10 and C-11 of this EA). If any archaeological resources are found during construction, work that might affect them will be suspended while the Utah SHPO and the Office of the State

Archaeologist are notified in accordance with the provisions of 16 USC 470, *et seq.*, at 470f.

Impacts on **historic properties** would not be significant. The historic structures survey revealed no property listed, eligible for listing, or potentially eligible for listing on the NRHP within 1.5 miles of any of the sites (Hauck, 1990). The Utah SHPO concurs with this determination (Appendix C, Dykman, 1991, pages C-10 and C-11 of this EA).

Significant impacts on **Native American traditional, religious, or sacred sites** are not anticipated. At BIA recommendation, four tribal organizations were written representing the Ute, Skull Valley Goshute, Paiute, and Goshute tribes. These tribes were notified, the GWEN project was explained, and information was requested regarding traditional, religious, or sacred sites located within the SSA. Representatives of the Paiute Tribe of Utah, the Goshute Indian Tribe of Utah, and the Skull Valley Goshute responded and expressed no concerns about the GWEN project (Anderson, 1990; Harrison, 1991; Quintana, 1991). No response has been received from the Ute Tribe to letters or several attempts at phone communication.

Visual impacts associated with a GWEN tower are discussed in Sections 3.8 and 4.8, pages 3.8-1 and 4.8-1, respectively, of the FEIS. The significance of a visual impact would depend on the visual dominance of the GWEN facility and the sensitivity of the affected views. Visual dominance is the degree to which a GWEN facility would compete with other features of the existing landscape for the attention of the viewer. Section 3.8.4, beginning on page 3.8-3 of the FEIS defines four levels of dominance, called Visual Modification Classes (VMC):

- VMC 1, not noticeable: the tower would be overlooked by all but the most interested viewers

- VMC 2, noticeable, visually subordinate: the tower would be noticeable to most viewers without being pointed out but would not compete with other features for their attention

- VMC 3, distracting, visually codominant: the tower would compete with other features in the landscape for the viewer's attention

- VMC 4, visually dominant, demands attention: the tower would be the focus of attention and tend to dominate the view.

Visual sensitivity is a measure of the public's reaction to a proposed change of the affected view and is a function of the viewer's activity, awareness, goals, and values. Consequently, the more sensitive the view, the stronger will be the public reaction to any alteration of it. Areas defined in the FEIS as having high visual sensitivity include national and state parks; designated scenic routes; designated national, state, or local historic sites where setting is important to their historic significance; and travel routes providing access to these sites. Examples of areas having medium visual sensitivity would be locally popular, but undesignated, beaches or public use areas, and the travel routes that provide primary access to them. Low visual sensitivity includes those views from sites, areas, travel routes, and sections of travel routes not identified as medium and high in sensitivity.

Significant visual impacts would occur if the relay node facility were to dominate or codominate (VMC 4 or 3) a high-sensitivity view or dominate (VMC 4) a medium-sensitivity view. If the relay node facility cannot be seen from medium-to-high sensitivity routes or areas, then visual impacts are not considered significant. Distance is the primary factor in determining visual dominance and therefore visual impacts. At distances greater than 3 miles, a GWEN tower would not be visible to the unaided eye. At 1.5 to 3 miles, the tower would be visually subordinate if noticeable (VMC 2) but more usually would not be noticed (VMC 1) because of its grey color and lack of mass. If a viewer at this distance actively sought the tower, it would appear as a thin vertical line on the horizon. Within 1.5 miles, the tower becomes a more important component of the view. In addition, other aspects of the tower's setting, such as focal point sensitivity, skyline complexity, competing feature interest, and topographic and vegetative screening, become important considerations in determining the level of visual impact.

USGS topographic maps and a windshield survey were used to determine whether high or medium sensitivity views were within 1.5 miles of the CGSs. No significant impacts are expected because there are no high or medium sensitivity views within 1.5 miles of any CGS.

4.2 Alternative 1: Brough Site (CGS-2)

No significant impacts are expected.

4.3 Alternative 2: Winn/Carter Site (CGS-6)

No significant impacts are expected.

4.4 Alternative 3: Bowles Site (CGS-7)

No significant impacts are expected.

4.5 Alternative 4: Steadman Site (CGS-8)

No significant impacts are expected.

4.6 Alternative 5: Millerberg Site (CGS-9)

No significant impacts are expected.

4.7 No Action Alternative

No environmental impact would result from adoption of the no action alternative.

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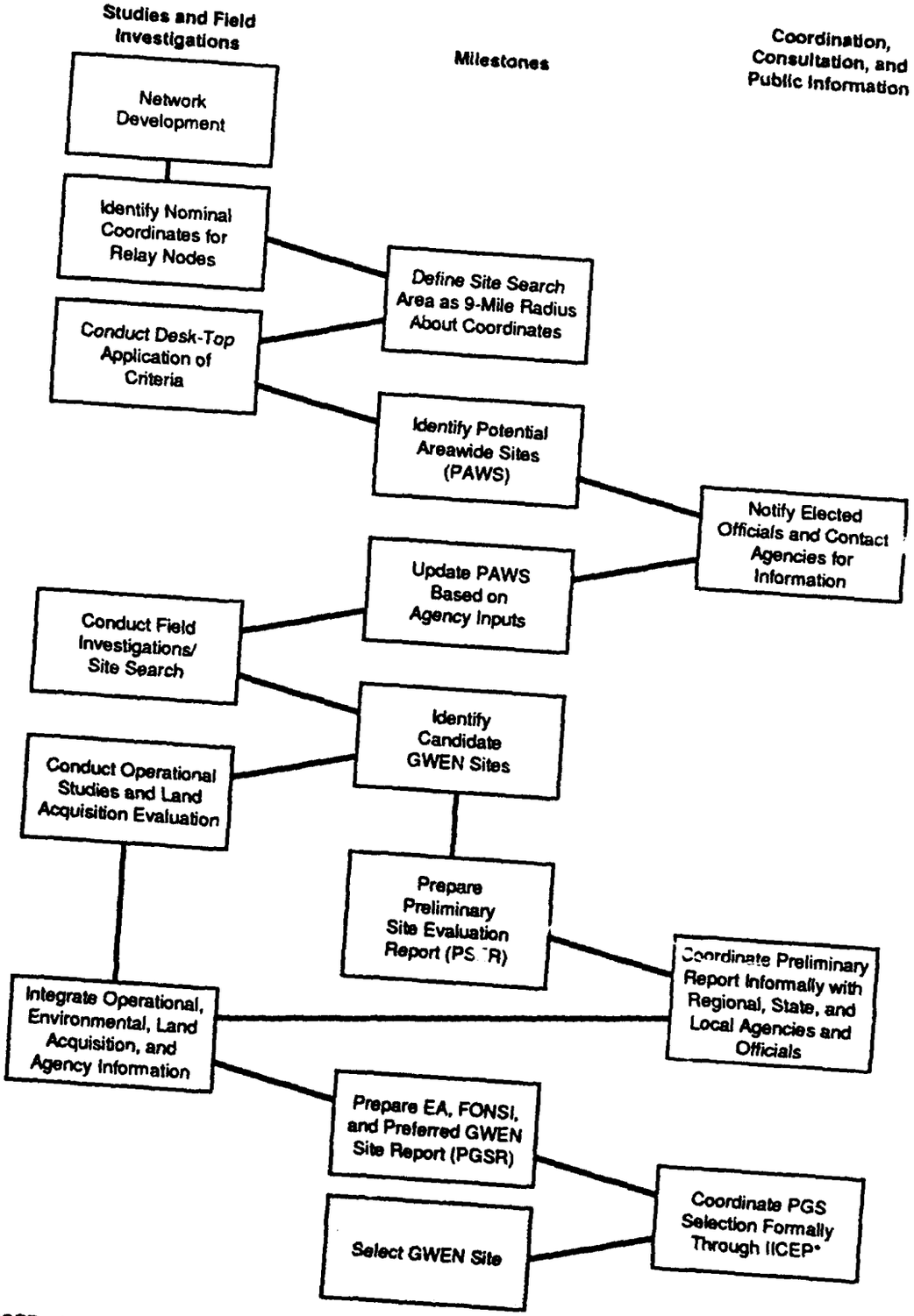
APPENDIX A

SITE SELECTION PROCESS

SITE SELECTION PROCESS

Figure A.1 of this EA shows the sequence of events during the selection of individual GWEN sites. Figure A.2 of this EA describes the screening process used during the field investigation to choose the candidate GWEN sites (CGSs). The environmental siting criteria applied in the site selection process are defined in Tables 5-1 and 5-2, pages 5-7 through 5-14 of the FEIS.



*IICEP = Interagency/Intergovernmental Coordination for Environmental Planning.

FIGURE A.1 GROUND WAVE EMERGENCY NETWORK SITE SELECTION PROCESS

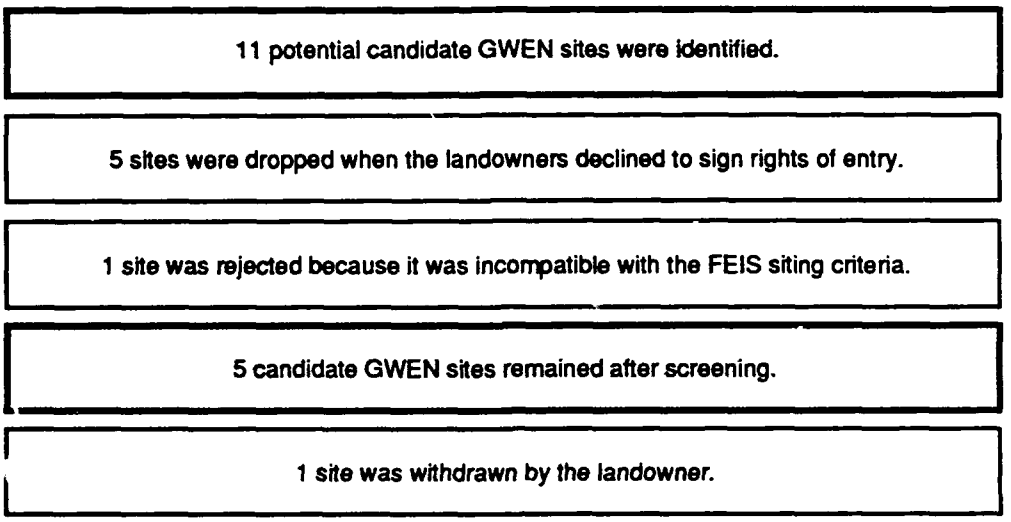


FIGURE A.2 RESULTS OF USING FEIS SITING CRITERIA TO SCREEN POTENTIAL CANDIDATE GWEN SITES IN THE CENTRAL UTAH SITE SEARCH AREA

APPENDIX B

TOPOGRAPHIC SETTINGS OF CANDIDATE GWEN SITES

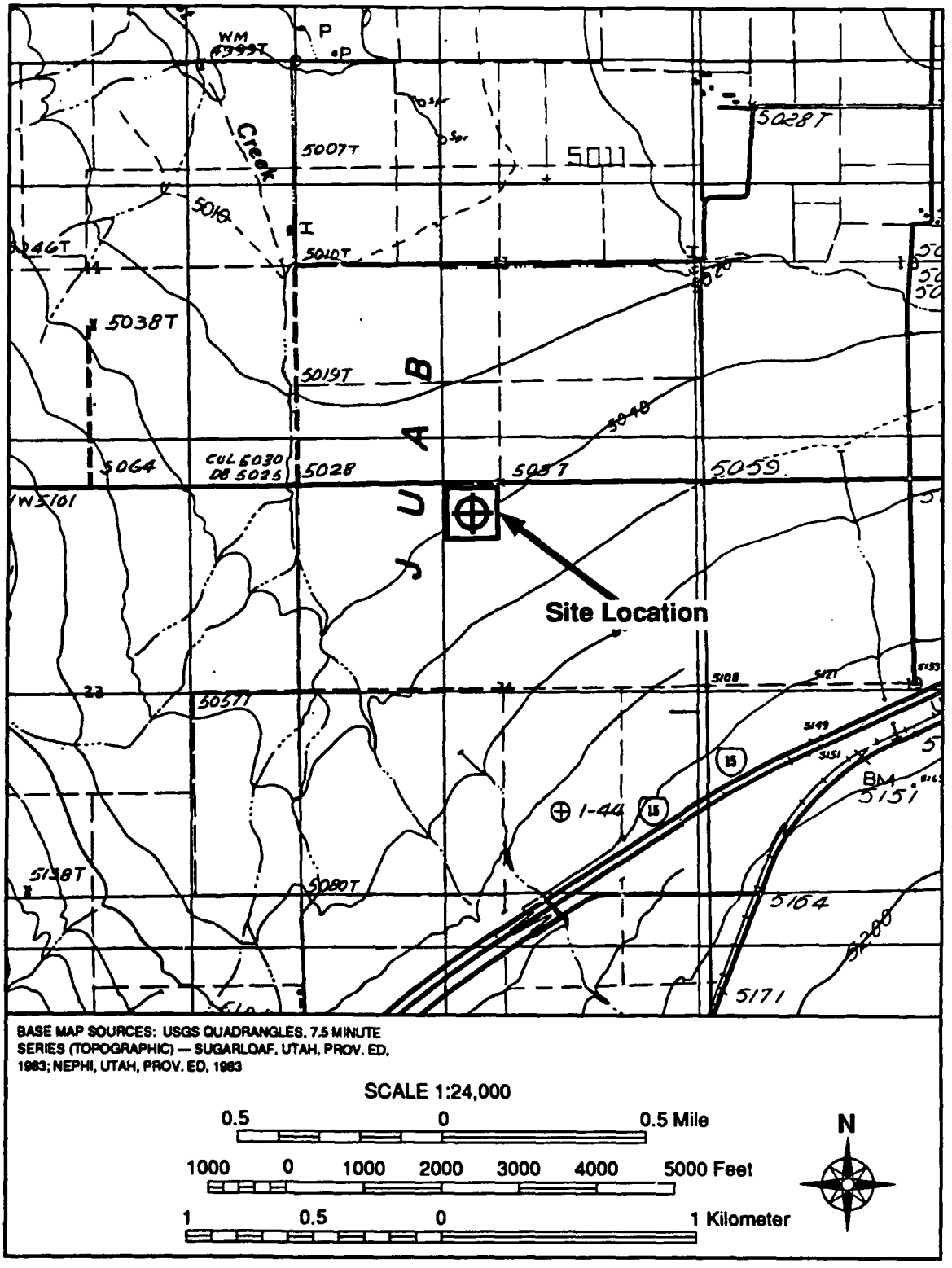


FIGURE B.1 TOPOGRAPHIC SETTING OF THE BROUGH SITE (CGS-2)

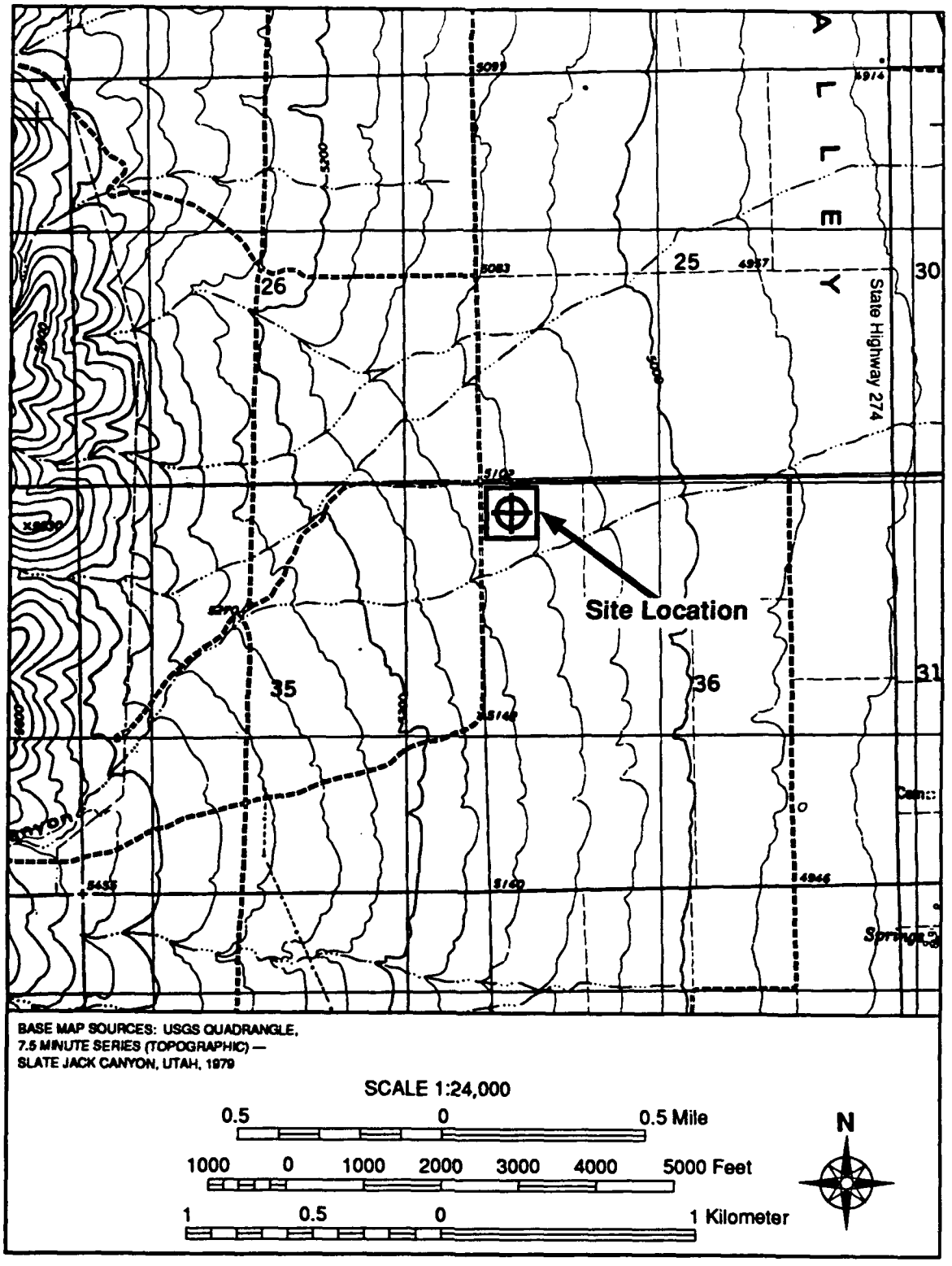


FIGURE B.2 TOPOGRAPHIC SETTING OF THE WINN/CARTER SITE (CGS-6)

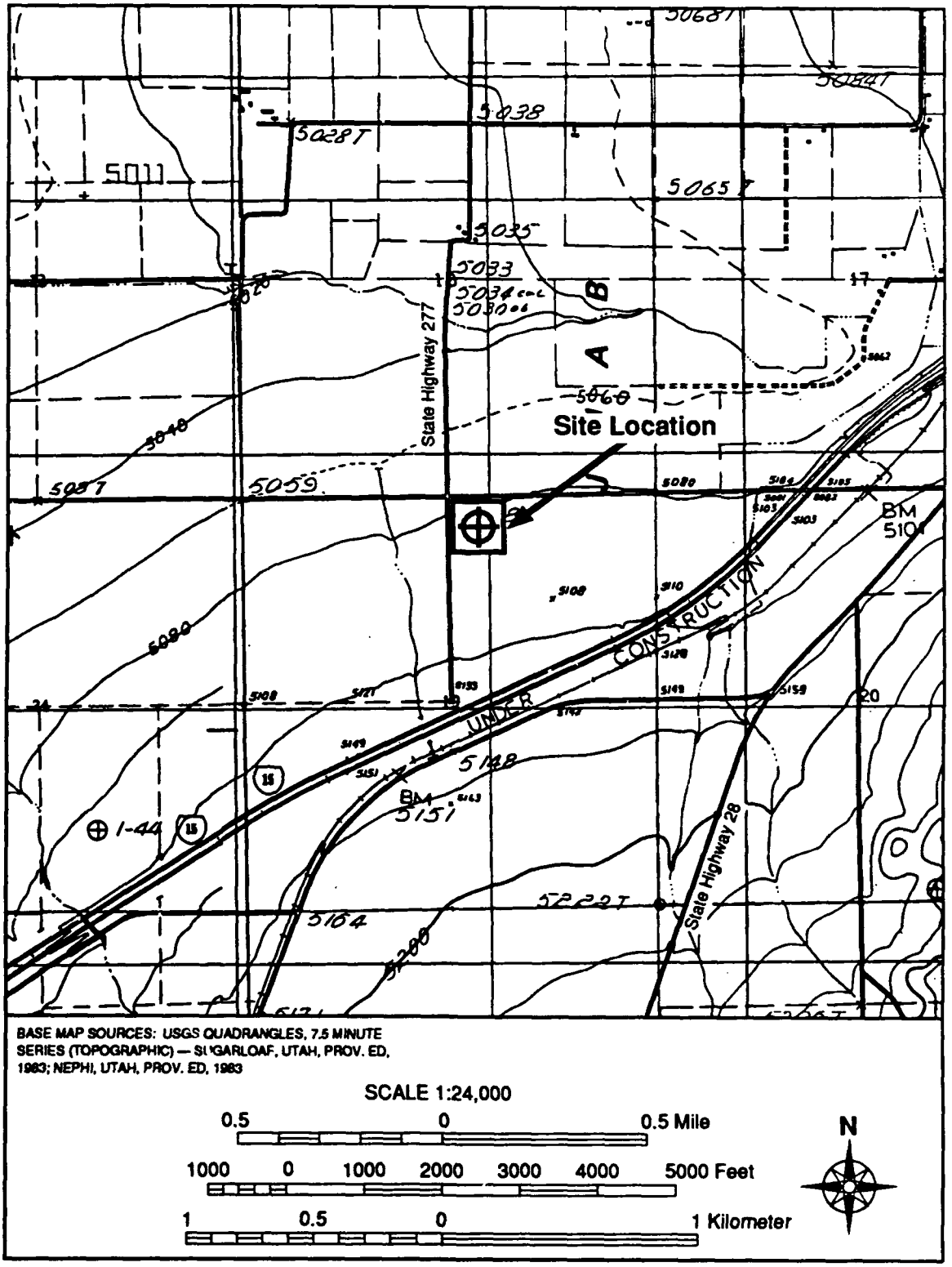


FIGURE B.3 TOPOGRAPHIC SETTING OF THE BOWLES SITE (CGS-7)

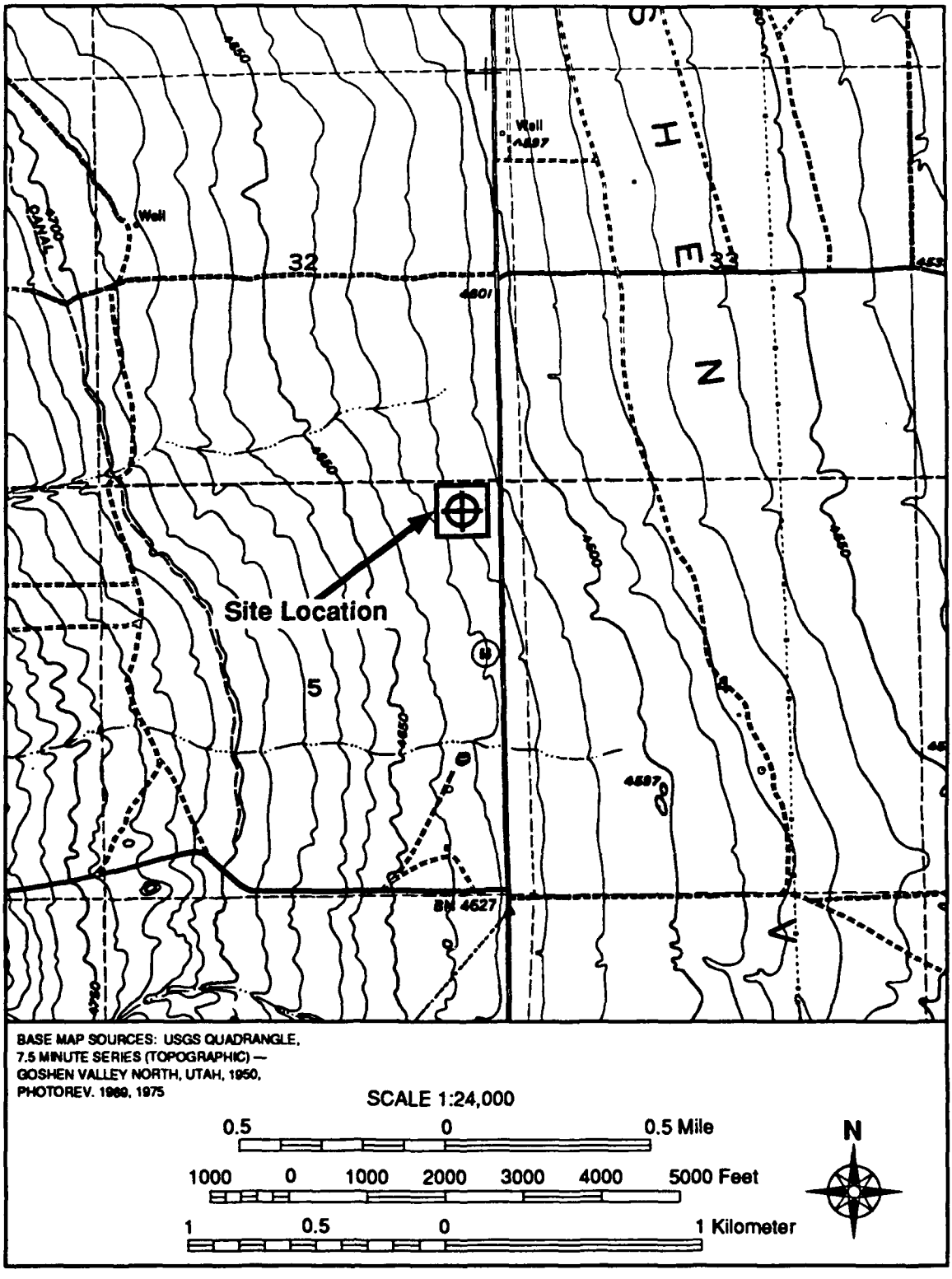


FIGURE B.4 TOPOGRAPHIC SETTING OF THE STEADMAN SITE (CGS-8)

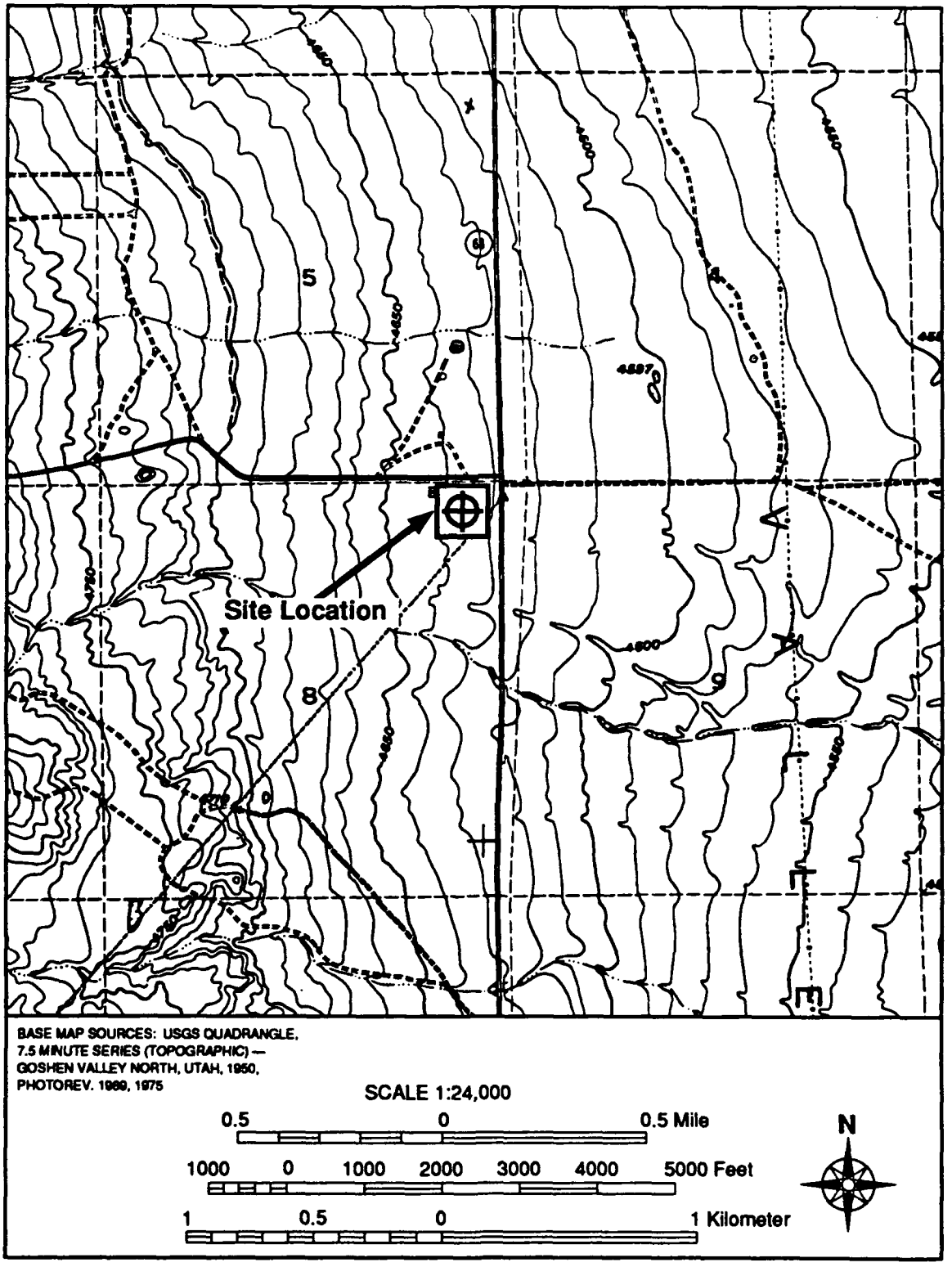


FIGURE B.5 TOPOGRAPHIC SETTING OF THE MILLERBERG SITE (CGS-9)

APPENDIX C

CORRESPONDENCE

CORRESPONDENCE

Appendix C documents contacts with the following federal and state agencies and Native American groups:

Individual	Agency	Date	Response
Clark D. Johnson, Assistant Field Supervisor	U.S. Department of the Interior, Fish and Wildlife Service	05-03-90 02-11-91 07-02-92	Attached Attached Attached
Robert D. Williams, State Supervisor	U.S. Department of the Interior, Fish and Wildlife Service	01-21-93 04-05-93	Attached Attached
James L. Dykman, Regulation Assistance Coordinator	Utah State Historical Society Division of State History	04-06-90 01-08-91 02-13-91	Attached Attached Attached
P. C. Harrison, Tribal Administrator	Goshute Indian Tribe of Utah	Letter sent 08-27-90. No written response has been received. Phone communication on 01-18-91.	
G. Anderson, Chairwoman	Paiute Tribe of Utah	Letter sent 08-27-90. No written response has been received. Phone communication on 01-16-91.	
D. Quintana, Attorney	Skull Valley Goshute Tribe	Letter sent 08-27-90. No written response has been received. Phone communication on 01-28-91.	
Luke Duncan, Chairman	Ute Indian Tribe	Letter sent 08-27-90. No response has been received to letter or attempts at phone communication.	

United States Department of the Interior
FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
UTAH STATE OFFICE
2078 ADMINISTRATION BUILDING
1745 WEST 1700 SOUTH
SALT LAKE CITY, UTAH 84104-5110

TAKE PRIDE IN AMERICA

In Reply Refer To
(FWE)

May 3, 1990

Ms. Jill Buxton
Earth Metrics Incorporated
2855 Campus Drive, Suite 300
San Mateo, California 94403

Dear Ms. Buxton:

We have reviewed your letter of March 29, 1990 concerning the U.S. Air Force's proposal to establish a radio communications relay node near Nephi, Utah.

It appears that the following listed endangered and threatened species may occur in the area of influence of this action:

Peregrine falcon	Falco peregrinus
Bald eagle	Haliaeetus leucocephalus
June sucker	Chasmistes liorus
Black-footed ferret	Mustela nigripes
Heliotrope Milk-vetch	Astragalus montii
Clay phacelia	Phacelia argillacea

We would like to bring to your attention species which are candidates for official listing as threatened or endangered (see Federal Register Vol. 54, No. 4, January 6, 1989 and Federal Register Vol. 55, No. 35, February 21, 1990). While these species have no legal protection under the Endangered Species Act, we ask that you try to avoid them if they are found in the area. Candidate species which may occur in the area of your project are:

Ferruginous hawk	Buteo regalis
Swainson's hawk	Buteo swainsoni
Western snowy plover	Charadrius alexandrinus nivosus
Western yellow-billed cuckoo	Coccyzus americanus occidentalis
Long-billed curlew	Numenius americanus
White-faced ibis	Plegadis chihi
Bonneville cutthroat trout	Oncorhynchus (=Salmo) Clarki Utah
Spangler's hydroporus diving beetle	Hydroporus spangleri
Utah hydroporus diving beetle	Hydroporus utahensis
Utah minute moss beetle	Limnebius utahensis
North American lynx	Felix lynx canadensis
North American wolverine	Gulo gulo luscus
Wasatch pika	Ochotona princeps wasatchensis
Heliotrope pika	Ochotona princeps moorei
No common name	Spiranthes diluvialis
Deseret milk-vetch	Astragalus desereticus

Creutzfeldt catseye	Cryptantha creutzfeldtii
Sedge fescue/Utah fescue	Festuca dasyclada
Canyon sweetvetch	Hedysarum occidentale var. Canone
No common name	Hymenoxys depressa
Hymenoxys Helenioides	Hymenoxys helenioides
Clay stickleaf	Mentzelia argillosa
No common name	Penstemon leptanthus
Tidestrom beardtongue	Penstemon tidestromii
Ward beardtongue	Penstemon wardii
No common name	Senecio dimorphophyllus var. intermedius
Plateau catchfly	Silene petersonii Var. petersonii
Talinum	Talinum validulum
Coalville mountainsnail	Oreohelix peripherica weberiana (Pilsbry, 1939)
Utah physa (=Utah bubble snail)	Physella (=Physa) Utahensis (Clench, 1925)
(Snail, no common name) (=Utah Roundmouth Snail)	Valvata utahensis call, 1884

In regard to the above list, this was taken from the Utah Latilong Block system which is used as a method of identifying those species of high Federal interest within a geographical region of the state. It would be in your best interest to screen this list further as there may be several which may not occur in the proposed project area as indicated on the map attached to your most recent request of April 4, 1990.

The Federal agency permitting or otherwise authorizing your project should review your proposed action and determine if the action would affect any listed species or their critical habitat. If the determination is "may affect" for listed species they must request in writing formal consultation from the Assistant Field Supervisor, U.S. Fish and Wildlife Service (Service) at the address given above. At that time you should provide this office a copy of the biological assessment and any other relevant information that assisted you in reaching your conclusion.

The Service can enter into formal Section 7 consultation only with another Federal agency, State, county, or any other governmental or private organizations can participate in the consultation process, help prepare information such as the biological assessment, participate in meetings, etc.

Your attention is also directed to Section 7(d) of the Endangered Species Act, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

The following addresses the issues that you have raised in regard to information that you are seeking for your report.

-National and State Wildlife Refuges, Preserves, and Sanctuaries

The Fish and Wildlife Service (Service) has no such interest in the immediate project area as indicated on the map attached to your letter. Concerning the issue of Utah State lands and interest, we suggest that you contact the various State land management agencies in this regard.

-Critical Avian Habitats and Flyways

The overall valley is a significant flyway for many migratory birds both common to Utah or passing through to breeding and wintering grounds in spring and fall. The Service would expect a high mortality of migrants during these spring and fall flights as a result of colliding with the tower wires. Raptors are less likely to suffer these mortalities unless they are scavenging for food around the towers. In which case it would not be unlikely for them to go after cripple birds that have flown into the tower guy wires and thus in turn become a victim of the guy wires.

-Threatened, Endangered, or State Sensitive Species

See above text and discussion.

-Critical Wildlife Habitat

The U.S. Fish and Wildlife Service has not listed any such habitat in this area as critical. However, the Service does suggest that you contact the Utah Division of Wildlife Resources in this regard in case they may have a interest in this issue.

-Sensitive Federal Lands.

The U.S. Fish and Wildlife Service has no interest in any sensitive lands in this area. The Service suggests that you should contact the other various Federal land management agencies in this regard.

-Wetlands and Riparian Areas

There are several areas of high interest within the project area as indicated on your map. The South half of Utah Lake has numerous acres of adjacent wetlands that are considered of high value to numerous species of waterfowl, shore and wading birds, and other wetland associated species. There are also large trees that provide winter roost sites for eagles and other raptors. To the west and north of Nephi, Utah, there are several small streams and Mona Reservoir which support riparian and wetland vegetation, all which is considered important wildlife habitat.

If you have questions or if we can be of further assistance, please advise us. The Service representative who will provide you technical assistance is Bob Freeman of this office (801) 524-5630 or FTS 588-5630.

Sincerely,

Clark D. Johnson
Assistant Field Supervisor

United States Department of the Interior
FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
UTAH STATE OFFICE
2078 ADMINISTRATION BUILDING
1745 WEST 1700 SOUTH
SALT LAKE CITY, UTAH 84104-5110

In Reply Refer To
(FWE)

February 11, 1991

Buford Holt, Senior Consultant
SRI, International
333 Ravenswood Ave.
Menlo Park, California 94025

RE: United States Air Force Ground Wave Emergency Network Project Central Utah (Juab and Utah Counties) Relay Node

Dear Mr. Holt:

We have received and reviewed your letter dated January 7, 1991 concerning the potential impacts on Federally listed threatened or endangered species and their habitats. We concur with your conclusion that, "no Federally listed threatened or endangered species, or species which are candidates for listing, would be affected by the project."

However, we do have concerns with other avian species that may inhabit the area or migrate through the area during spring and fall migrations. As the proposed project sites are within a major migration corridor for birds of the mountain west, we would expect to see a higher mortality rate resulting from collisions with the project structure during these migration seasons. Attached is a recently received scenario addressing this issue and ways to reduce bird mortality resulting from these structures. The Fish and Wildlife Service strongly recommends these measures be incorporated into the project design to reduce this mortality.

Thank you for submitting your findings for our review and comment.

Sincerely,

Clark D. Johnson
Assistant Field Assistant

Enclosure

TOWERS AND GUY WIRES

Radio and other communications towers can also impact bird populations through direct collision mortality (Avery et al. 1976). Because of the potential for obstructing airspace occupied by aircraft, the Federal Aviation Administration requires that flashing lights be installed on all towers greater than 180 feet in height. Depending on the type of lights installed birds will either be attracted to or repelled by lights. Probably the most dangerous situation for birds in flight is to install flashing white strobe lights. In fog situations, the flashing white light becomes highly diffused and for some reason causes birds to be attracted to the light source. Once attracted, the birds fly in circles around the light source in increasingly tighter patterns eventually colliding with the structure. As an alternative when lights must be installed, we recommend that flashing or constant red lights be used. Red light does not diffuse in fog situations and is consistent with FAA regulations.

Guy wires extending from towers probably kill more birds in flight than do the tower structures (Kemper et al. 1964). As with power lines, the guy wires are more dangerous because of their reduced visibility. On towers we recommend that 9 or 12 inch yellow aviation marker balls be placed on the guy wires in an alternating pattern to increase visibility of the wires. A general recommendation is to place the first marker ball 100 feet from the top of the tower, then each additional ball should be placed at 50 foot intervals to within 50 or 75 feet of the ground. Consideration should be given to staggering the arrangement of balls on the guy wires so that each wire has a minimum number of marker balls, but to a bird in flight it appears that there are marker balls placed continuously over the structure. This recommendation is consistent with the scenario spelled out for power line marking earlier.

SELECTED REFERENCES

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Kemper, C.A., S.D. Robbins and A.C. Epple. 1964. The ornithological flood of September 18-20, 1963. Passenger Pigeon 26:159-172.

Division of State History
(Utah State Historical Society)
Department of Community and Economic Development
300 Rio Grande
Salt Lake City, Utah 84101-1182
801 533 5755

Norman H. Bangerter
Governor
Max J. Evans
Director

April 6, 1990

Jill Buxton
Earth Metrics Incorporated
2855 Campus Drive, Suite 300
San Mateo, CA 94403

RE: Radio Communications Relay Node Site near Nephi, Utah, (GWEN) System

In Reply Please Refer to Case No. M258

Dear Ms. Buxton:

The Utah State Historic Preservation Office has reviewed our cultural resource files for the above requested project area. The project area has had several surveys which cover part of the study area. A total of eighteen sites are located in Juab County and forty three in Utah County. This may not be all of the sites because our information about the area is limited and the maps that we are working with our not detailed. Concerning information need, our office has provided this preliminary information to indicate that there are a number of cultural resources in the area, and several surveys. Our office would like to discuss what detailed information you need to have about existing data in order to complete your environmental work. Our office would be glad to assist in any way that we can. Concerning Native American concerns, I believe the best contact for this area would be the Paiute Tribe of Utah. I have attached their address for your information.

A survey of the area will likely lead to the identification of more resources, some of which may be eligible for the National Register of Historic Places. It is your responsibility, based on this assessment, to determine the need for further actions, such as field surveys or predictive models to identify historic properties. If you choose to do this, we will be glad to comment on your evaluation of historic properties against the National Register criteria (36 CFR 60.4) should any sites be found. We will also assist in applying the criteria of effect as outlined in 36 CFR 800.5.

This information is provided on request to assist the Air Force in identifying historic properties as specified in 36 CFR 800 for Section 106 consultation procedures. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

James L. Dykman
Regulation Assistance Coordinator

JLD:M258 DOD
cc: RDCC

Norman H. Bangerter
Governor
Max J. Evans
Director

State of Utah

Division of State History
(Utah State Historical Society)
Department of Community and Economic Development
300 Rio Grande
Salt Lake City Utah 84101-1182
801 533-5755

FAX 801-364-6436 January 8, 1991

Buford Holt
Senior Consultant
SRI International
333 Ravenswood Avenue
Menloe Park, CA 94025

RE: United States Air Force Ground Wave Emergency Network Project Central Utah (Juab and Utah Counties) Relay Node

In Reply Please Refer to Case No. M258

Dear Mr. Holt:

The Utah State Historic Preservation Office received the above referenced report on January 4, 1991. The report states that no cultural resources were located during the survey of this project area. We, therefore, concur with your recommendation that no historic properties will be impacted by the project.

This information is provided on request to assist SRI International with its Section 106 responsibilities as specified in 36 CFR 800. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

James L. Dykman
Regulation Assistance Coordinator

JLD:M258 DOD/NP/NE

Norman H. Bangerter
Governor
Max J. Evans
Director

State of Utah

Division of State History
(Utah State Historical Society)
Department of Community and Economic Development
300 Rio Grande
Salt Lake City, Utah 84101-1182
801-533-5755
FAX 801-364-6436

February 13, 1991

Buford Holt
Senior Consultant
SRI International
333 Ravenswood Avenue
Menlo Park, CA 94025

RE: United States Air Force Ground Wave Emergency Network Project, Central Utah (Juab and Utah Counties) Relay Node

In Reply Please Refer to Case No. M258

Dear Mr. Holt:

The Utah State Historic Preservation Office has received the above referenced project. After review of your letter; our office Concurs with the determination of No Historic Properties based on review of the project. Our office also understands that if sites are located, that measures outlined by 36 CFR 800.11 will be used.

The above is provided on request as outlined by 36 CFR 800 or Utah Code, Title 63-18-37. The Utah SHPO makes no regulatory requirement in this matter. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

James L. Dykman
Regulation Assistance Coordinator

JLD:M258

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
UTAH STATE OFFICE
2078 ADMINISTRATION BUILDING
1745 WEST 1700 SOUTH
SALT LAKE CITY, UTAH 84104-5110

TAKE PRIDE IN AMERICA

In Reply Refer To

(FWE) July 2, 1992

Stephen T. Martin, Lt. Col., USAF
Program Manager, GWEN
Department of the Air Force
Headquarters Electronic Systems Division (AFSC)
Hanscom Air Force Base, Massachusetts 01731-5000

RE: Updated Species List For GWEN Project in Central Utah

Dear Colonel Martin:

In regard to your request of June 12, 1992, we are providing the following to provide you with an update for the referenced project Environmental Assessment (EA). Changes to the May 3, 1990 species list are as follows:

Threatened and Endangered Species

Ute ladies'-tresses	Spiranthes diluvialis

(a plant previous listed as a candidate species with no common name; should be changed and listed as threatened)

Candidate Species for Listing (Add to List)

Northern goshawk	Accipiter gentilis
Black tern	Chlidonias niger
Western least bittern	Ixobrychus exilis hesperis
Loggerhead shrike	Lanius ludovicianus
Spotted frog	Rana pretiosa
Carrington daisy	Erigeron Carringtonae

The following may be removed from the list of candidate species provided in our previous correspondence, dated May 3, 1990. They are:

Long-billed curlew	Numenius americanus
Sedge fescue/Utah fescue	Festuca dasyclada
Hymenoxys Helenioides	Hymenoxys helenioides
Clay stickleaf	Mentzelia argillosa

No common name	Senecio dimorphophyllus var. intermedius
Talinum	Talinum validulum
Coalville mountainsnail	Oreohelix peripherica weberiana (Pilsbry, 1939)
Utah physa	Physella (=Physa) Utahensis (Clench, 1925)

If you have questions or if we can be of further assistance, please advise us.

Thank you for updating the Fish and Wildlife Service of the changes in the proposed project.

Sincerely,

Clark D. Johnson
Assistant Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
UTAH STATE OFFICE
2078 ADMINISTRATION BUILDING
1745 WEST 1700 SOUTH
SALT LAKE CITY, UTAH 84104-5110

TAKE PRIDE IN AMERICA

In Reply Refer To

(FWE)

January 21, 1993

Stephen T. Martin, Lt. Col., USAF
Program Manager, GWEN
Department of the Air Force
Headquarters Electronic Systems Division (AFSC)
Hanscom Air Force Base, Massachusetts 01731-5000

Dear Lt. Col. Martin:

We received your request on December 22, 1992, for an updated species list for the U.S. Air Force's proposed Ground Wave Emergency Network (GWEN) project near Nephi, Utah. Some changes have been made to the list of federally threatened, endangered, or candidate species as specified in our letter to you of July 2, 1992. The remainder of this letter serves as a current, updated species list for the proposed GWEN project and supersedes any previous species lists issued by this office. This species list applies only to the GWEN site search area as depicted in Attachment 1 of your Preliminary Site Evaluation Report of June 26, 1990 for GWEN, Central Utah (Node 4C920UT).

It appears that the following listed threatened (T) and endangered (E) species may occur in the area of influence of this action:

peregrine falcon (E)	*Falco peregrinus*
bald eagle (E)	*Haliaeetus leucocephalus*
June sucker (E)	*Chasmistes liorus*
Ute ladies'-tresses (T)	*Spiranthes diluvialis*
Utah valvata snail (proposed E)	*Valvata utahensis*

The U.S. Fish and Wildlife Service (Service) would also like to bring to your attention species which are candidates for official listing as either threatened or endangered species (Federal Register Vol. 55, No. 35, February 21, 1990 and Federal Register Vol. 56, No. 225, November 21, 1991). While these species have no legal protection at present under the Endangered Species Act, we would ask that you take care to avoid them or their habitat if they are found in the area of your project. These species are:

ferruginous hawk	*Buteo regalis*
western snowy plover	*Charadrius alexandrinus nivosus*
loggerhead shrike	*Lanius ludovicianus*
white-faced ibis	*Plegadis chihi*
black tern	*Chlidonias niger*

western least bittern	*Ixobrychus exilis hesperis*
spotted frog	*Rana pretiosa*
Utah hydroporus diving beetle	*Hydroporus utahensis*
pygmy rabbit	*Brachylagus idahoensis*
Deseret milk-vetch	*Astragalus desereticus*
Tidestrom beardtongue	*Penstemon tidestromii*

The Air Force should review its proposed actions and determine if any action would affect any listed species or their critical habitat. If the determination is "may affect" for listed species, you must request in writing formal consultation from the Supervisor, at the address given above. At that time you should provide this office a copy of the biological assessment and any other relevant information that assisted you in reaching your conclusion.

The Service can enter into formal Section 7 consultation only with another Federal agency. State, county, or any other governmental or private organizations can participate in the consultation process, help prepare information such as the biological assessment, participate in meetings, etc.

Your attention is also directed to Section 7(d) of the Endangered Species Act, as amended, which underscores the requirement that the Federal agency or the applicant shall not make any irreversible or irretrievable commitment of resources during the consultation period which, in effect, would deny the formulation or implementation of reasonable and prudent alternatives regarding their actions on any endangered or threatened species.

If you have any questions please contact us. The Service representative who will provide you technical assistance is Marilet A. Zablan at (801) 975-3630.

Sincerely,

BOB WILLIAMS

Robert D. Williams
State Supervisor

bcc: AWE-Mail Stop 60120
Official file
Reading file

C:\WP51\AIRFOR\GWEN1.MAZ
file:air force/ground wave emergency network (GWEN)
ZABLAN/mz/kk: 1/21/93

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
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In Reply Refer To

April 5, 1993

Stephen T. Martin, Lt. Col., USAF
Program Manager, GWEN
Department of the Air Force
Headquarters Electronic Systems Division (AFSC)
Hanscom Air Force Base, Massachusetts 01731-5000

Dear Lt. Col. Martin:

The Fish and Wildlife Service (Service) received the request on February 22, 1993, for concurrence with the U.S. Air Force's findings regarding Federally listed threatened and endangered species and the proposed Ground Wave Emergency Network (GWEN) site in central Utah. From previous correspondence, the Service understands the candidate GWEN sites are within an area in central Utah encompassing the communities of Nephi, Elberta, and Goshen.

In response to the request, the Service concurs with the Air Force's "no effect" determination for the threatened species, Ute ladies'-tresses (*Spiranthes diluvialis*) and the proposed endangered species, Utah valvata snail (*Valvata utahensis*).

The Air Force's interest in conserving threatened and endangered species is appreciated. If further assistance is needed, please advise. The Service representative who will provide technical assistance is Marilet A. Zablan, Wildlife Biologist, at (801) 975-3630.

Sincerely,

for Robert D. Williams
State Supervisor

APPENDIX D

GLOSSARY

GLOSSARY

Abbreviations and Units of Measure

AM	Amplitude modulation
ATU	Antenna tuning unit
BIA	Bureau of Indian Affairs
BUPG	Back-up power group
$CaCO_3$	Calcium carbonate
CGS	Candidate GWEN site
dBA	Decibels on the A-weighted scale, which is a measure of the intensity of the sounds people can hear
DOE	U.S. Department of Energy
EA	Environmental Assessment
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement; in this document, the term refers to the FEIS for the GWEN Final Operational Capability that was released in September 1987 by the U.S. Air Force, Electronic Systems Division, Hanscom Air Force Base, Massachusetts

FICWD	Federal Interagency Committee for Wetland Delineation
FOC	Final Operational Capability, the third phase of development of GWEN
FONSI	Finding of No Significant Impact
GPO	Government Printing Office
GWEN	Ground Wave Emergency Network
HEMP	High-altitude electromagnetic pulse
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning, the formal review process for the EA
kHz	Kilohertz
LF	Low frequency
mg/l	Milligrams per liter (1 mg/l = 1 ppm)
MM	Modified Mercalli, a scale of the severity of earthquake effects
µg/l	Micrograms per liter (1 µg/l = 1 ppb)
NRC	National Research Council, the principle operating agency of the National Academy of Sciences and the National Academy of Engineering
NRHP	National Register of Historic Places

PAWS Potential areawide sites; the portion(s) of an SSA left after application of those siting criteria that do not require a field survey, such as the location of national and state parks

PCGS Potential candidate GWEN site; any site that is identified from roadside surveys as suitable for further investigation

PGS Preferred GWEN site; the CGS identified by the Government that represents the Government's preferred location for a relay tower

ppb Parts per billion

ppm Parts per million

PSER Preliminary Site Evaluation Report

SCS Soil Conservation Service, a unit of the United States Department of Agriculture

SHPO State Historic Preservation Officer; the person responsible for administering the National Historic Preservation Act at the state level, reviewing National Register of Historic Places nominations, maintaining data on historic properties that have been identified but not yet nominated, and consulting with federal agencies concerning the impacts of proposed projects on known and unknown cultural resources

SSA Site search area; the 250-square-mile area within which four to six CGSs are identified; the SSA is the area within a 9-mile radius of a set of nominal coordinates in the network design. It is used as a manageable range in which to conduct siting investigations

TLCC Thin Line Connectivity Capability; the second phase of development of GWEN

UCPC	Utah County Planning Commission
UDT	Utah Department of Transportation
UHF	Ultrahigh frequency (band); specifically 300 to 3,000 megahertz
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMC	Visual Modification Class
WPA	Works Projects Administration

Definitions

Air pollutant	An atmospheric contaminant, particularly the 15 atmospheric contaminants specified in federal and most state regulations
Alluvial	Pertaining to loose river sediments, such as clay, silt, sand, and gravel
Anaerobic	Occurring in the absence of free oxygen
Aquifer	A water-bearing stratum of permeable rock, sand, or gravel

Candela	A unit of measure of the intensity of light equal to the brightness of one candle
Cultural resource	Prehistoric, Native American, and historic sites, districts, buildings, structures, objects, and any other physical evidence of past human activity
Evaluative criteria	Applied to portions of a potential siting area for a GWEN facility to determine its suitability. Areas that rank low against evaluative criteria may be excluded from consideration, or given a low priority in the site selection process
Exclusionary criteria	Criteria used to eliminate or exclude highly sensitive areas or areas that do not meet the limits of acceptable performance from consideration for GWEN facilities
Fault	A break in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust; adjacent surfaces are differentially displaced parallel to the plane of fracture
Federal jurisdictional wetland	As defined in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (GPO 1989-236-985/00336), a wetland is a class of habitat distinguished by the presence of saturation to the surface or standing water during at least 1 week of the growing season (wetland hydrology), a soil type characteristic of saturated or poorly drained conditions (hydric soils), and the predominance of plants that only or mostly occur on wet sites (hydrophytic vegetation)
Floodplain	Land adjacent to a river which is commonly covered by water during high flow periods

Fremont culture	A pre-historic culture of the American southwest (A.D. 550 to 1300) distinguished by pottery-making skills, some agriculture, and the bow and arrow
Fugitive dust	Wind-blown dust
Great Basin	A physiographic region of the United States characterized by lack of external drainage
Ground plane	A part of the antenna system consisting of buried copper wires that extend radially from the base of a GWEN tower for a distance of approximately 330 feet
Historic properties	For purposes of this EA, historic properties are those aboveground structures and cultural resources that are listed or eligible for listing on the National Register of Historic Places
Hydric soil	A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part
Igneous rock	Rock formed from the molten state, such as basalt or granite
Mesozoic era	A geologic period of time 66 million to 245 million years ago

Modified Mercalli scale	A measure of the intensity of seismic activity based on the potential for damage; the intensity is rated on a Roman numeral scale ranging from I to XII. An earthquake of MM intensity I would be detectable only by seismographs; MM intensity V would shake buildings, break dishes and glassware, and cause unstable objects to fall; MM intensity X would destroy most masonry and frame structures, bend railroad rails slightly, and cause tidal waves and landslides; MM intensity XII would cause nearly total destruction of all buildings. Another commonly used seismic intensity scale, based on readings from a seismograph, is the Richter scale, which was developed in 1935. The Modified Mercalli scale is often used when the historic period to be covered includes data prior to 1935
Montane	A biographic zone of relatively moist cool upland slopes below timberline dominated by large evergreen trees
Native American	A generalized reference to an individual whose ancestry may be traced to one of the indigenous American cultures
Nomadic	Roaming about from place to place usually seasonally and within a well-defined territory in order to secure a food supply
Paleontological	Pertaining to fossils or the study of fossils
Paleozoic era	A geologic period of time 590 million to 248 million years ago
pH	A measure of acidity in which the lower the number, the more acidic the substance; 7 represents neutrality

Phase I survey	A survey designed to identify properties that are listed, eligible for listing, or potentially eligible for listing on the National Register of Historic Places within the area that would be affected by a proposed project
Prime farmland	Land that contains soils having high crop production either naturally or through modification; the U.S. Soil Conservation Service is responsible for designating prime farmland
Raptor	A bird of prey
Sedimentary rock	Rock formed by the consolidation or cementation of particles deposited by water or wind
Soils of state-wide importance	Soils deemed by the Soil Conservation Service or a state agricultural agency as being among the better agricultural soils in the state even though they do not qualify as prime farmland
Tertiary period	Geologic period of time from 2 million to 66 million years ago
Top-loading element	Portions of the GWEN antenna that extend diagonally from the top of the tower, which strengthen the signal and provide additional structural support like guy wires
Tundra	A level or undulating treeless plain that is characteristic of arctic and subarctic regions, and supports a dense growth of dwarf herbs